IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David B. Wallace

Serial No: 10/085,396 Examiner: Hartman Jr., R.

Filed: 02/28/2002 Group Art Unit: 2121

For: BULK INVENTORY NETWORK SYSTEM

Commissioner for Patents

Alexandria, VA 22313

Sir:

AFFIDAVIT OF DAVID B. WALLACE UNDER 37 C.F.R. 1.131

I, David B. Wallace, the sole inventor named in the above-identified patent application ("the'397 application") state as follows:

1. All of the events outlined below occurred in the United States of America.
2. Prior to April 22, 1996, I invented a system for a transportation carrier to maintain sufficient quantities of dry bulk materials at a remote manufacturing site. This embodiment of my invention includes generating a first signal representative of an existing dry bulk material quantity at a remote site. The system also includes transmitting a second signal corresponding to a first signal, from a remote site to at least one of a local computer and a central computer at predetermined time intervals. The system determines the existing dry bulk material quantity and projected material usage rate for the existing dry bulk material quantity based on these transmitted signals. The system then orders additional dry bulk materials from a preselected vendor based on the existing material quantity and the projected material usage rate. The system includes providing a transport vehicle to deliver the additional dry bulk material from a preselected vendor to the manufacturing site. The additional dry bulk

material is transported from the preselected vendor to the manufacturing site. The system ensures that the additional dry bulk material is supplied to the manufacturing site before the existing dry bulk material is depleted.

3. Prior to April 22, 1996, I invented a system for a transportation carrier to maintain sufficient quantities of dry bulk materials at a remote manufacturing site which produces at least one of an audible and a visual alarm, via a central computer, if the material level falls below a predetermined level. This embodiment of my invention includes generating a first signal representative of an existing dry bulk material quantity at a remote site. The system also includes transmitting a second signal corresponding to the first signal, from a remote site to at least one of a local computer and a central computer at predetermined time intervals. The system determines the existing dry bulk material quantity and projected material usage rate for the existing dry bulk material quantity based on these transmitted signals. The system then orders additional dry bulk materials from a preselected vendor based on the existing material quantity and the projected material usage rate. The system includes providing a transport vehicle to deliver the additional dry bulk material from the preselected vendor to the manufacturing site. The additional dry bulk material is transported from the preselected vendor to the manufacturing site. The system ensures that the additional dry bulk material is supplied to the manufacturing site before the existing dry bulk material is depleted and produces at least one of an audible and a visual alarm, via the central computer, if the material level falls below a predetermined level.

4. Prior to April 22, 1996, I also invented a system for a transportation carrier to maintain sufficient quantities of dry bulk materials at the remote manufacturing site that includes generating a first signal representative of

an existing dry bulk material quantity at a remote site using one of an ultrasonic and a strain gauge detector to generate the first signal. The system then transmits a second signal corresponding to the first signal, from the remote site to at least one of a local computer and a central computer at predetermined time intervals and determines the existing dry bulk material quantity and projected material usage rate for the existing dry bulk material quantity based on these transmitted signals. The system orderes additional dry bulk materials from a preselected vendor based on the existing material quantity and the projected material usage rate and provides a transport vehicle to deliver and transport the additional dry bulk material from the preselected vendor to the manufacturing site. The system suppies the additional dry bulk material to the manufacturing site before the existing dry bulk material is depleted.

5. I am currently employed by J.P. Donmoyer, Inc., of Ono, Pennsylvania, as Director of Marketing and Sales.

6. I was Director of Marketing and Sales at J.P. Donmoyer, Inc., at the time of the conception of my invention.

7. I am not trained as an engineer, nor do I possess any special education or background in any of the engineering or scientific arts.

8. As a consequence of my lack of the engineering skill necessary to pursue my invention, it has been necessary for me to seek the advice and assistance of companies and individuals that specialize in the design and manufacture of inventory level systems in order to both memorialize my conception of the invention and to reduce it to practice.

9. As a part of my on-going, diligent efforts to reduce my invention to practice, I compiled a list of major companies who specialized in inventory leveling systems, via the internet and industry trade journals. I made numerous contacts via telephone to discuss my conception of a system

and method for a transportation carrier to maintain a sufficient quantity of raw materials at a remote site, and to seek engineering support for the design of such a system according to my conception and related functional specification.

a. Companies contacted included:

Celteck of New Orleans, LA

Bin-Master of Lincoln NE

Monitor Manufacturing

Apptech Engineered Systems of Plumsteadville, PA

Magyar Associates, Allentown, PA.

10. Each of the foregoing companies were provided with a verbal disclosure of an embodiment of my invention including at least a system for monitoring a dry bulk material quantity at a remote site comprising a detector for producing a first output signal corresponding to an existing material quantity; a remote telemetry unit for receiving the first output signal from the detector and producing a second output signal corresponding to the first output signal; and a computer coupled to the remote telemetry unit for receiving the second output signal from the remote telemetry unit, the computer including software for determining the existing material quantity and a projected usage rate for the existing material quantity based on the second output signal.

11. On or about February 9, 1996, Fred Coffey of Apptech Engineered Systems reviewed my conception of a system and method for a transportation carrier to maintain a sufficient quantity of raw materials at a remote site. Fred, on the basis of this discussion, stated that it would be possible to design such a system according to my requirements.

12. Attached as Exhibit A is a copy of a note from Fred Coffey, dated February 9, 1996, providing a quote for a plumb bob unit as well as a

confirmation of his follow up to obtain data flow from each silo-based unit back to our central computer in accordance with the conception of my invention verbally expressed to him during our telephone conversation.

13. On or about February 12, 1996, Fred Coffey discussed options for using Apptech Engineered Systems' plumb bob system in such a manner to provide the ability to receive updates from multiple silo-based units back to a central computer. Fred thought that Apptech Engineered Systems could design a "black box" for each site which could work on a modem line. However, Apptech Engineered Systems had not done this at this point and a special technician would have to be assigned.

14. Attached as Exhibit B is a copy of a facsimile note from Fred Coffey, dated February 12, 1996, memorializing the conversation referred to in paragraph 16.

15. On or about February 20, 1996, Steve Adams, Product Manager, BIN Master, Lincoln, NE contacted Frank Constanzo, General Manager of J. P. Donmoyer to discuss the invention.

16. Attached as Exhibit C is a copy of a follow-up letter from Steve Adams, dated February 20, 1996, to confirm conversation details as well as to provide a preliminary sketch of a proposed embodiment of my inventory monitoring system as discussed during the telephone conversation. Steve's letter represents factual evidence of my conception of the complete invention prior to April 22, 1996, in the form of a diagrammatic sketch and explanatory letter.

17. On or about March 7, 1996, Steve Adams of BIN Master conducted a sales call at J.P. Donmoyer, in Ono, PA, to provide a product demonstration of his product, the Smart Bob. Steve discussed the use of the Smart Bob as a detector for producing a first output signal corresponding to an existing material quantity in a storage bin or vessel.

18. Attached as Exhibit D are copies of follow-up letters from Steve Adams, dated March 8th and 19th, 1996, to confirm details of the presentation held on 7th March.

19. On or about March 28, 1996, Peter Wells of Apptech Engineered Systems, conducted a sales presentation at J.P. Donmoyer. Peter Wells was the technical representative working at the direction of Fred Coffey. (See paragraphs 13-17 above). Peter presented a potential embodiment of my invention incorporating a "black box" to operate as a remote telemetry unit. This devise would transmit data, via modem, to any source chosen via a phone line.

20. Attached as Exhibit E is a copy of a follow-up letter from Peter Wells, dated April 8, 1996, to confirm conversation details and issues raised during his presentation of March 28, 1996.

21. On or about May 30, 1996, Mike Karpa of Magyar Associates made a sales call at J.P. Donmoyer in Ono, PA. Mike Karpa is a manufacturer's representative for Kistler Morse, and is employed by Magyar Associates. Mike presented various types of leveling systems as well as options to retrieve data from a site and transmit that data back to a central computer where the data could be displayed for the logistical purpose of consistent product replenishment in accordance with the conception of my invention. Mike advised he had experience with a private engineering company, Tri-Star, Inc., who would have the ability to design the complete system to link into either a Kistler Ultra Sonic and/or Kistler load cell detector. Mike agreed to arrange a meeting with Tri-Star.

22. Attached as Exhibit F is an Affidavit from Michael Karpa verifying his involvement in the reduction to practice of my invention.

23. On or about June 10, 1996, a second meeting was held at J.P. Donmoyer in Ono, PA including the same individuals as the May 20, 1996 meeting,

and also including Walter Maidl, Vice President Sales, Allen Baumbach II, Project Engineer, Tri-Star, Inc., Middletown, PA . The preferred embodiment of my invention was discussed in detail. Tri-Star agreed to produce a working remote telemetry unit (RTU) to be installed at a customer site for an experimental use of my invention. The RTU would be able to take a standard 4/20 ma read based on preprogrammed times and transmit that data, via phone line, with no restrictions on distance. A modified SCADA program would be installed in a computer at J.P. Donmoyer which would translate the data in a historical trend analysis, and provide comparisons of variable flow rate changes. Maidl was instructed by me on behalf of J.P. Donmoyer to provide a formal proposal and quote for the project.

24. On or about June 12, 1996, Mike Karpa of Magyar Associates and Walt Maidl visited the Pennsylvania Steel Technologies (PST) facilities located at Steelton, Pennsylvania, to verify the availability of existing 4-20 line for the purpose of installing a prototype embodiment of my invention for test ("the PST project"). It was determined that there was a need to run 50 yards of phone line to make on-site modem connection.

25. On or about July 3, 1996, Tri-Star Inc., provided a proposal detailing the installation of a Bulk Inventory Network System (BINS) in accordance with my invention for the PST project at Bethlehem Steel.

26. Attached as Exhibit G is a copy of Tri-Star Inc.'s proposal dated July 03, 1996, and follow-up letters dated July 15th, August 5th, and August 6th, detailing the installation of a Bulk Inventory Network System (BINS) in accordance with my invention.

27. On or about July 12, 1996, I received a formal quote from Tri-Star for an I/O Operating System to be used in connection with my invention. Tri-Star

agreed to purchase the I/O Operating System from Control Micro Systems,via Mike Karpa.

28. On or about August 1, 1996, I had a conversation with Tim Miller of Kimmel Coal Services, Wiconisco, PA. Tim was aware of the PST project. I stated to Tim that PST would like to see his injection carbon levels handled in the same manner. Tim expressed interest to allow me to test multiple silos at the PST site. The same was reviewed with Allen Baumbach of Tri-Star and Mike Karpa of Magyar.

29. On or about August 27, 1996, I raised concerns over delivery delays of required components. Tri-Star stated that reasons for delay on the PST project included:(i) the VS/2 had not shipped yet, and (ii) the PST site also required modem activation. I contacted Mike Karpa to request a push of his people. Mike provided a September 26th delivery date.

30. On or about October 13, 1996, JP Donmoyer personnel, including myself, made a presentation to PST, Steelton. The experiments associated with reduction to practice of the invention were detailed. The PST Project would be under my direct control so that I could monitor and direct the efforts toward perfecting the invention's essential qualities. The project was estimated to be completed and functioning on site within thirty days. Robert Siddall assigned John Martz an electronics technician for PST to install the required signal line. Attendees at the meeting included: Robert Siddall of PST, John Martz of PST, Joe Hahn of PST, Anthony Mantione of Pennsylvania Lime, Inc., David Wallace of JP Donmoyer, Frank Costanzo of JP Donmoyer and Mike Egbert of JP Donmoyer.

31. Attached as Exhibits H, I, and J are the Affidavits of Robert Siddall of PST, John Martz of PST, and Anthony Mantione of Pennsylvania Lime, Inc., in support of the foregoing factual evidence of diligent work towards a

reduction to practice of my invention and the undertaking of an experimental installation at PST.

32. On or about October 28, 1996, John Martz of PST Steelton advised me that the Kistler Morse microcells had arrived at the Steelton site. Allen Baumbach of Tri-Star was notified to install them.

33. On or about November 15, 1996, a commitment by Allen Baumbach was received that the system would be installed at PST Steelton by the following week.

34. On or about December 12, 1996, Tri-Star moved on site at PST Steelton, and the installation of an experimental embodiment of my invention was begun. Additional training issues with the software were encountered at that time.

35. On or about December 30, 1996, the system had been functioning at PST Steelton on a limited basis, and not according to expected results. The modem appeared to be hanging up and not closing, with future reads of data not being obtained. Tri-Star advised that the signal line could be the source of the problems. Considerable disagreement occurred among the parties involved as to why the system of my invention was not functioning properly. Tri-Star agreed to attempt multiple solutions to correct the problems.

36. On or about January 14, 1997, Tri-Star could not resolve the modem problem with the unit installed at that time. Tri-Star advised me that the problems were not resulting from their installation nor of their programming. Tri-Star advised that it must be a problem with the hardware which should all be replaced. In addition to the modem issues, the time on the computer installed and programmed by Tri-Star was displaying incorrect times.

37. On or about January 27, 1997, another complete replacement unit was ordered by Tri-Star, via Mike Karpa. No other solutions were offered by Tri-Star at that time. At my direction, a decision was made to start the PST project over again, with the assumption that the foregoing errors were too difficult to identify and solve.

38. On or about January 30, 1997, Kistler Morse advised that they believed that the problems encountered to date resulted from signal line noise. Mike Karpa agreed to test the signal lines at the PST site with PST employee John Martz.

39. On or about February 12, 1997, Tri-Star installed a VS/2 unit. Some improvement was noted in performance of the system, but disruptions of data flow from the on-site remote telemetry unit (RTU) were still encountered and reported to me.

40. On or about February 24, 1997, the same problems with the new hardware (wrong time, disconnects, corrupted data) were reported to me. Mike Karpa had one of the technicians get involved with Tri-Star to resolve these recurring problems.

41. On or about February 28, 1997, Kistler went on site for a joint inspection with Tri-Star, and found a faulty RS-232 adaptor for the VS/2. Kistler advised that replacement of this component should correct current problems reported to me.

42. On or about April 1, 1997, as a result of the foregoing correction, system performance improved. However, when the computer self-booted it would no longer collect data. This was an issue in the off hours at PST and the J.P. Donmoyer facility, when the system was not manned. I was now advised by Allen Baumbach of Tri-Star that he thought that our problem is Wave Conversion on the Win 11 modem they had installed. He suggested to replace modem to correct the foregoing problem.

43. On or about May 23, 1997, the system performance was still inconsistent in that it worked fine for a period of time, and then for no apparent reason disconnected at the site, with no additional data being transmitted.

44. On or about June 9, 1997, we added a second silo of injection carbon to the PST Steelton RTU. Control screens for the software were programmed at JP Donmoyer Operations Ono, PA. This installation provided us the opportunity to test two silos over the same RTU. This would aid us in evaluating problems still occurring with the original site installation.

45. On or about October 3, 1997, data reads from the second silo of injection carbon were inconsistent. There were high swings in volume displayed on the screens, which were unrealistic. Mike Karpa was asked by me to evaluate the Kistler Monitoring System. At this point I did not have faith that Tri-Star could assist with this due to their past proven inabilities to handle and/or correct issues with the system. I was highly disappointed in their support on this project.

46. On or about October 29, 1997, I was actively working with Kimmel Coal Services to add Nucor Inc., of Darlington, South Carolina, to my experimental test project. This additional, very remote site would help us to verify if issues encountered at PST Steelton were isolated or an issue with the system as a whole.

47. In and around November 1997, I visited the Nucor Inc., Darlington, South Carolina facility and discussed the system. A Tour of the site and silos revealed that existing monitoring equipment would have to be upgraded prior to introducing my invention. Nucor agreed to upgrade their existing silo monitoring level equipment and J.P. Donmoyer would cover all of the project costs to install my invention.

48. On or about December 1, 1997, I received a bid quote from Walt Maidl of Tri-Star. I felt the cost that Tri-Star presented was way out of line. Their response indicated a reluctance to participate in the future on the project. Discussed the issue with Mike Karpa. He had some alternative contact suggestions. I also decided at this time to contact Steve Lowry of Steve Lowry Associates, to determine his interest as a Project Manager.

49. Attached as Exhibit K is an Affidavit from Steve Lowry verifying his involvement in the reduction to practice of my invention.

50. On or about December 7, 1997, I contacted Steve Lowry regarding engaging him as a project manager and principal engineering consultant to aide in the implementation of my invention at Pennsylvania Steel Technologies, Nucor, South Carolina, and New Jersey Steel locations.

51. On or about January 30, 1998, I met with Steve Lowry to discuss the existing implementation of my invention at the PST project and to review with him the various problems that had been encountered during my attempt to implement a working embodiment of my invention. I also provided Steve with examples of the software (Lookout) and manual for his review.

52. During the months of February and March, 1998, Steve Lowry reviewed the existing implementation of my invention, the hardware and software associated with that implementation, and the various problems related to both software and hardware that had occurred at the PST project during the previous twelve months.

53. On or about April 13, 1998, I received a formal written proposal from Steve Lowry for a revised bulk inventory network system according to my invention including various software and hardware upgrades that were proposed by him as solutions to the problems encountered at the PST project.

54. Attached as Exhibit L, is a copy of the engineering report dated April 13, 1998.

55. In and around the month of May, 1998, Steve Lowry became intimately involved with the three experimental installations of my invention at PST, Nucor, and New Jersey Steel. Steve also worked to upgrade the Lookout software, the remote telemetry unit, and the interface between these devices and the detectors and central computer.

56. During the months of June and July 1998, Steve Lowry continued to implement the plan outlined in his April 13, 1998 report. He also worked on enhancing the Lookout programming and upgrading the remote telemetry unit for the Nucor Site.

57. During the months of August and September 1998, Steve installed the updated version of the Lookout software and the redesigned remote telemetry unit at the New Jersey Steel and Nucor installations.

58. Between May 1, 1998 and September, 1998, the implementation of my invention as suggested in Steve Lowry's report was undertaken at the PST project, the Nucor, South Carolina location, and at New Jersey Steel.

59. On September 19, 1998, the implementation of my invention at the Nucor, South Carolina facility fully functioned according to my expectations and in conformance with the anticipated results of implementing my invention as conceived prior to April 22, 1996.

60. In or around November, 1998, the implementation of my invention at the PST facility fully functioned according to my expectations and in conformance with the anticipated results of implementing my invention as conceived prior to April 22, 1996.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that

willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issuing thereon.

Date: August 8, 2000

David B. Wallace

PH1\1475057.1

EXHIBIT A

Applech Engineered Systems

System and Components for Handling Bulk Solids

Pneumatic Convey
Mechanical Convey
Automatic Batching Controls
Storage Silos
Flow Aids
Mixing & Blending
Total Turnkey System

PHONE: #215-766-0200
FAX: #215-766-2455

OIPE SC177 MAR 1 3 2001 PATENT & TRADEMARK OFFICE

TO: BILL GERHART FROM: FRED COFFEY

CO: VONMOYER TRUCKING No. of Pages (Incl. cover) ____

FAX: _____ DATE: 2/9/96

RE: _____

IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL US BACK ASAP

MESSAGE:

BILL - ENCLOSED IS LITERATURE ON THE MONITOR CM-3A PLUMBOB UNIT. THE LIST PRICE EACH IS $910.00.

I'LL CALL ON MONTAY WITH ADD'L INFORMATION ON THE PLC UNIT TO BE LOCATED AT EACH SILO FARM AND THE METHOD TO ACCESS THE INVENTORY DATA FROM YOUR CENTRAL COMPUTER.

Fred

P.O. Box 1330, Plumsteadville, PA 18949, Phone (215) 766-0200

EXHIBIT B

OIPE
MAR 1-3 2001
PATENT & TRADEMARK OFFICE

Apptech Engineered Systems

PHONE: #215-766-0200
FAX: #215-766-2455

System and Components for Handling Bulk Solids

Pneumatic Conveyors
Mechanical Conveyors
Automatic Batching Controls
Storage Silos
Flow Aids
Mixing & Blending
Total Turnkey Systems

TO: BILL GERHART FROM: FRED COFFEY

CO: VONMOYER TRUCKING No. of Pages (Incl. cover) 2

FAX: 717-792-4191 DATE: 2/12/96

RE:

IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL US BACK ASAP

MESSAGE:

BILL - IN ADDITION TO THE INDIVIDUAL CM-3A PLUMBOB UNITS - ONE PER SILO - WE COULD FURNISH A "BLACK BOX" AT EACH SILO GROUP. THIS BOX COULD TAKE LEVEL SIGNALS FROM UP TO 15 SILOS. IT WOULD HAVE THE ABILITY TO TAKE READINGS ON A TIMED BASIS (ONCE EVERY 4 HRS, FOR EXAMPLE) OR ON DEMAND FROM YOUR CENTRAL COMPUTER. IT COULD ALSO STORE THE LAST 10 READINGS FROM EACH SILO AND TRANSMIT TO YOUR COMPUTER SCREEN ON DEMAND, OVER THE TELEPHONE MODEM LINE.

THE COST FOR THE TELEPHONE SERVICE SHOULD NOT BE EXPENSIVE,

SINCE IT IS A "RECEIVE ONLY" TYPE OF SERVICE.

THE "BLACK BOX" SHOULD COMMUNICATE WITH MOST PC's.

THE "BLACK BOX" WOULD RUN ABOUT $200.00 EACH.

IF YOU WOULD LIKE TO TALK TO OUR PANEL BUILDER, WHO WOULD BUILD THE BLACK BOX, AND GO OVER IN DETAIL ANY TECHNICAL QUESTIONS THAT YOU MAY HAVE, I WOULD BE GLAD TO PUT YOU IN TOUCH.

PLEASE CALL OR FAX ANY QUESTIONS OR COMMENTS THAT YOU MAY HAVE.

Thanks,

Ted Coffey

EXHIBIT C

Steve Adams
Product Manager

BINMASTER®
THE LEVEL CONTROL EXPERTS

Division of Garner Industries
4200 North 48th St. / Lincoln, NE 68504-1498
(402) 434-9102 / FAX (402) 434-9133

BINMASTER
THE LEVEL CONTROL EXPERTS

OIPE
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

February 20, 1996

Mr. Frank Costanzo
JP Donmoyer
PO Box 74
Ono, PA. 17077

Dear Mr. Costanzo:

Thank you for your inquiry and questions regarding the BinMaster Smart Bob Inventory Management System.

I have enclosed a product brochure and a system manual describing in more detail the operation of our system.

As we discussed, I recommend that you consider each location as a small system that can be linked as a network to your home office. This can be achieved quite easily without much additional expense. Each location would be allowed to monitor their own storage vessels and also allow you to monitor those same vessels from your location.

In addition to the product information, I have also enclosed a preliminary layout of the system schematic based upon the isolated locations communicating back to the home office.

Should you have more specific questions after reviewing the enclosed information, please contact me at 800-278-4241. Thank you for your interest.

Sincerely,

Steve Adams
Product Manager

Division of Garner Industries / 4200 North 48th St. / Lincoln, NE 68504-1498 / (402) 434-9102 / FAX (402) 434-9133

BINMASTER®

THE LEVEL CONTROL EXPERTS

MAR 13 2001
PATENT & TRADEMARK OFFICE

FAX Your Level Control Application to BinMaster
FAX Number: (402) 434-9133

Name Mr. FRANK COSTANZO

Company JP Donmoyer

Address Po Box 74

City ONO State PA Zip 17077

Phone (717) 865-2148 FAX ( )

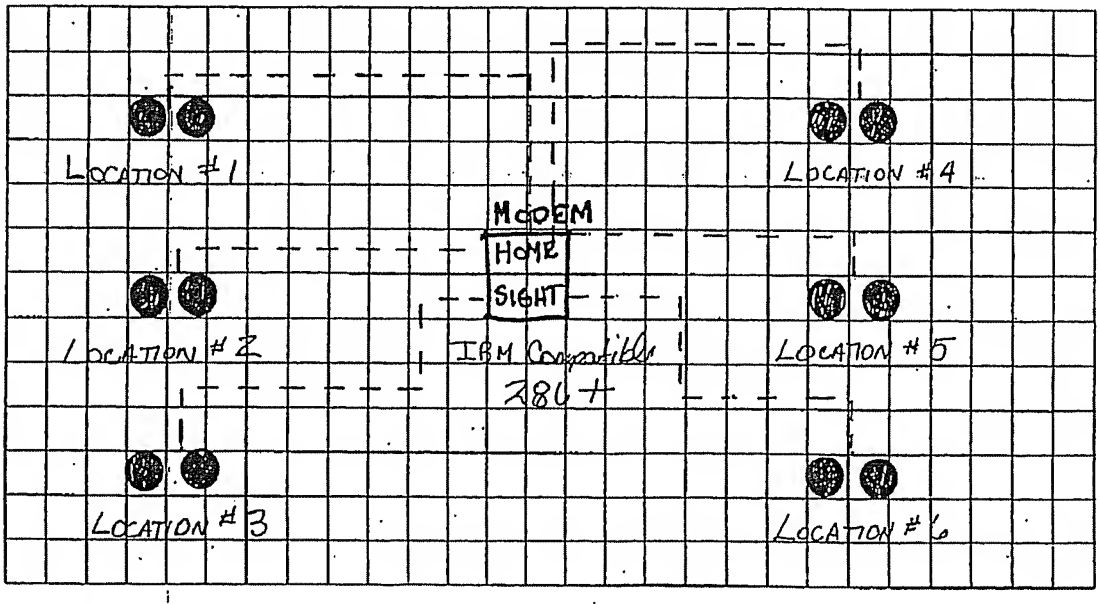
Describe Your Application:

Material: Dry ___ Liquid ___ Slurry ___

Output: High Level ___ Intermediate ___ Low Level ___

Continuous X Fail-Safe ___ Intrinsically Safe ___

Sketch Your Application:



Send More Information: Rotary ☐ Capacitance Probe ☐ Bin-Bob ☐ *Smart*BOB ☒
Tilt-Switch ☐ Diaphragm ☐ Aeration Pads ☐ Complete Product Catalog ☐

BINMASTER / 4200 North 48th St. / Lincoln, NE 68504 / (402) 434-9102 / FAX (402) 434-9133

BINMASTER®
THE LEVEL CONTROL EXPERTS

OIPE
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

JP Donmoyer
February 20, 1996

Referring to System Schematic

* Each location is set up as small system. Requires SBRX Sensor on each tank, Power Supply and duplicated IMS Software. System operated from IBM Compatible 286 or better PC.

* Each location would then be linked via a modem back to home sight PC.

* Home Sight PC will have IMS Software duplicated for all isolated locations and linked via a modem to each individual sight. Measurements can be taken from this location utilizinga PC Anywhere Software valuedat $ 89.00.

* This arrangement will allow measurements to be activated from home office as well as taken from each invidual location sight.

SBRX	$ 1400.00	
16V Power Supply	$ 138.00	
IMS Software	$ 995.00	Duplications offered
Communication Cable	$ 1.50 Ft.	

Contact Steve Adams at 800-278-4241 with any questions.

EXHIBIT D

Steve Adams
Product Manager

BINMASTER®
THE LEVEL CONTROL EXPERTS

Division of Garner Industries
4200 North 48th St. / Lincoln, NE 68504-1498
(402) 434-9102 / FAX (402) 434-9133

BINMASTER®
THE LEVEL CONTROL EXPERTS

Friday, March 08, 1996

Mr. Frank Costanzo
JP Donmeyer
PO Box 74
Ono, PA 17077

Dear Frank:

It was a pleasure visiting with you yesterday and discussing your unique application. As requested, I have included a partial users list of the Smart Bob System. Once again, these are being operated from same location, however, the only difference would be utilizing a computer modem for separate locations.

Also, as promised I have enclosed four tickets to the upcoming Powder and Bulk Solids Show in Chicago. This show is streamlined for the dry processing industry highlighting every form of equipment available for improved processing.

I look forward to discussing your application further with possible demonstration once your buying intention is nearer. Should you have additional questions, please contact me at 800-278-4241. Thank you for your interest.

Sincerely,

Steve Adams

Steve Adams
Product Manager

Directory

Steve Adams
BinMaster Level Controls
4200 North 48th Street
Lincoln, Nebraska 68504

Page: 1
Report Date: 3/8/96
Time: 9:06AM
Number of Contacts: 7

Primary	Secondary
Associated Feeds & Supply Jon Lundskoog Ext: CC:1 Fax: 5213 W. Main Turlock CA 95381	Assistant:
Calva Products Phil Williams Ext: CC:1 Fax: 4351 Wiwery Road Acampo CA 95220	Assistant:
General Mills Bob Calton Ext: CC:1 Fax:	Assistant:
Griffin Industries Rob Warren Ext: CC:1 Fax: County Road 400 West Newburry IN 47449	Assistant:

Directory

Steve Adams
BinMaster Level Controls
4200 North 48th Street
Lincoln, Nebraska 68504

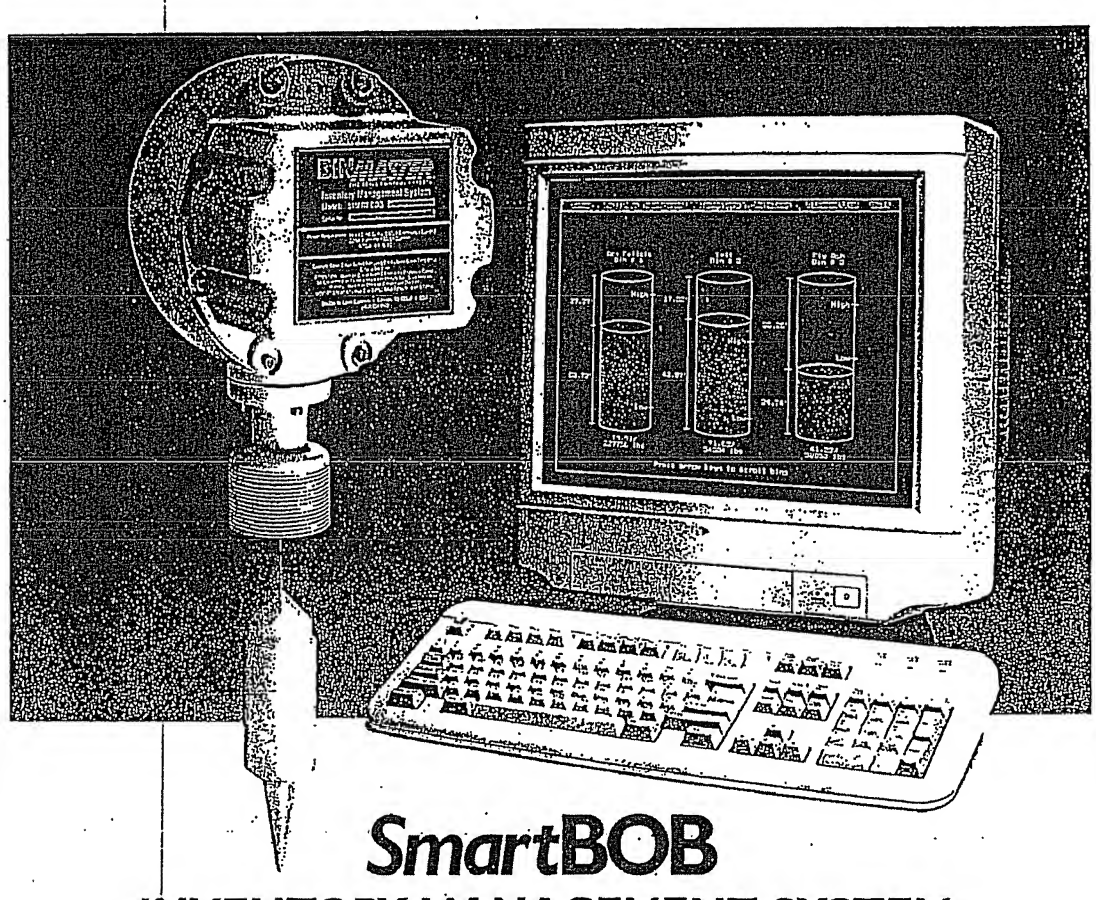
Page: 2
Report Date: 3/8/96
Time: 9:06AM
Number of Contacts: 7

Primary	Secondary
Hartz Mountain Corp. Rob Post Ext: CC:1 Fax: 192 Bloomfield Ave. Bloomfield NJ 07003	Assistant:
KAO Infosystems, Inc. Gary Brune 508-747-5520 Ext: CC:1 Fax:508-747-5521 40 Grissom Rd. Plymouth MA 02360	Assistant:
Tri-Seal International, Inc. Brannin Russell 914-353-3300 Ext: CC:1 Fax:914-353-3376 217 Bradley Hill Rd. Blaauvelt NY 10913	Assistant:

MAR 1 3 2001
PATENT & TRADEMARK OFFICE

BINMASTER®

THE LEVEL CONTROL EXPERTS



SmartBOB

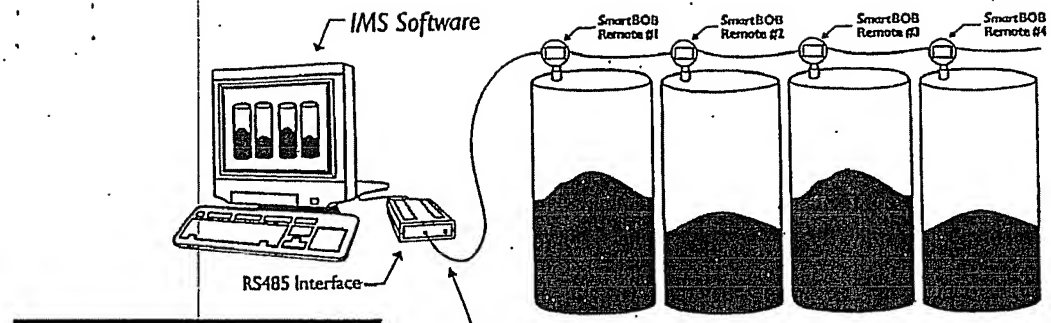
INVENTORY MANAGEMENT SYSTEM

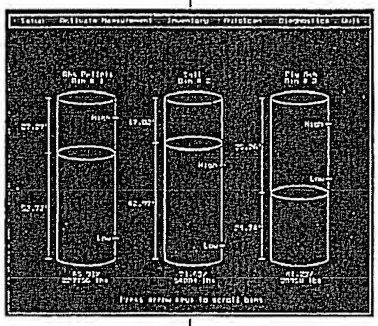
NEW DESIGN PRODUCES ADVANCED, AFFORDABLE LEVEL CONTROL

***Smart*Bob** IMS is an on-demand level measurement system for solids and liquids. Using microprocessor based Remote Sensing Units and specially designed PC compatible software, BinMaster is the first to design an affordable inventory management system with sophisticated measurement capabilities.

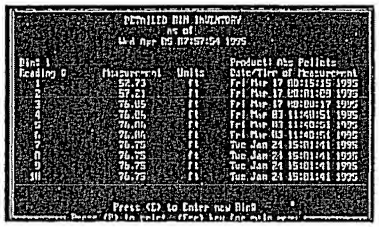
REMOTE SENSING UNIT – FAST, ACCURATE AND RELIABLE

***Smart*Bob Remote** measures material with a high-speed weighted probe that travels at 2.5 feet per second. It provides accurate mechanical measurement to the nearest one-tenth of a foot. The ***Smart*Bob Remote** may be used to measure a variety of materials - chemicals, plastics, cement, coal, pulp, grain - in open or closed vessels up to 150 feet. It's specially designed for reliable operation in humid, dusty and extreme temperature applications. The rugged industrial enclosure meets Class I and Class II specifications (approvals pending).

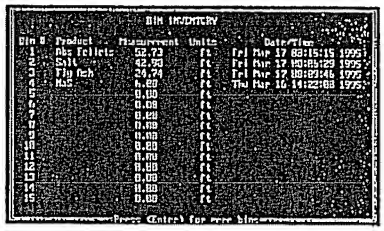




VISUAL MEASUREMENT



DETAILED



INVENTORY

IMS SOFTWARE PROVIDES INVENTORY MANAGEMENT CAPABILITIES

***Smart*Bob** IMS Software runs on an IBM compatible PC and controls up to 30 Remote Sensing Units from one location. The system uses a RS-485 network which requires less wiring and simplifies installation. With user friendly "pull-down" menus, the software provides a graphic representation of material measurements by distances, weight and percentage in English and in metric units. It also provides inventory history, measurement scheduling and high/low alarms. Plus it can interface with a printer to provide hard copy documents of each function.

U.S. PTO
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

*Smart*BOB SPECIFICATIONS

Power Requirements: 16VAC 50/60Hz
Power Consumption: ..... 2VA Continuous
36VA Intermittent
Current Draw: ..... 0.125A Continuous
2.25A Intermittent
Operating Temperature: ..... 32°F to 185°F (0° to 85°C)
Operating Temperature
with Heater: ..... -40°F to +185°F (-40°C to +85°C)
Pressure: ..... Atmospheric
Measurement Range: ..... 60 ft Standard
150 ft maximum
Measurement Rate: ..... 2.5 ft/sec (typical)
Measurement Accuracy: ..... 0.1 ft (0.03m)
Repeatability: ..... 0.1 ft (0.03m)
Resolution: ..... 0.15 inch (0.4cm)
Communication: ..... RS-485 Half Duplex
Wiring Distance: ..... 4000 ft (1220m)
Enclosure: ..... Type 4X, 5, 7, 9, 12
Explosion Proof Class I Group C & D
Class II Group E, F, & G
(approvals pending)

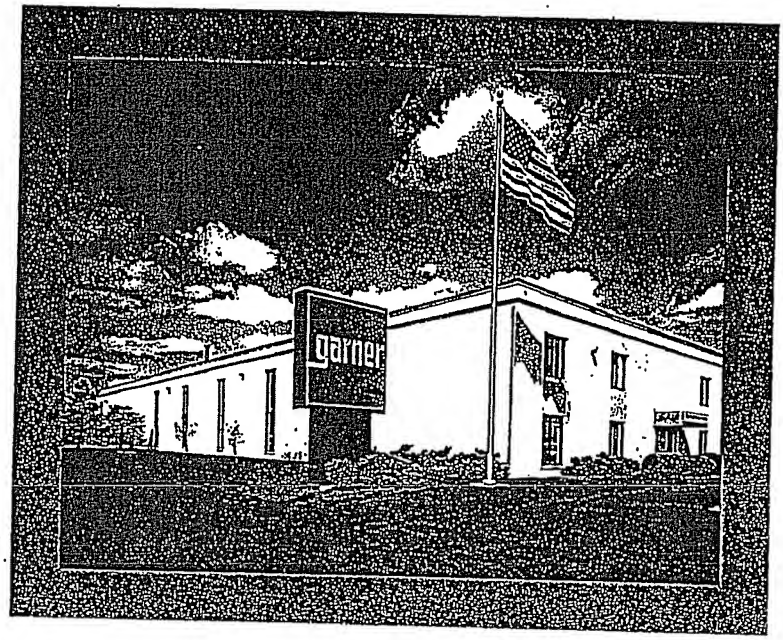
Mounting: ..... 3" -8 NPT floor flange
Conduit Entry: ..... 3/4" NPT
Weight: ..... 25 lbs.
Diameter: ..... 9"
Height: ..... 14"
Depth: ..... 9 1/2"
Air Purge Entry: ..... 1/4"-18 NPT
Cable: ..... 316 Stainless Steel
0.037"-diameter
Nylon Coated
Warranty: ..... One Year

OPTIONS

Heater: ..... 25W 40°F
Probes: ..... Spiked, Float, or Bottle
Transformer: 120VAC/16VAC, 150VA
120VAC/16VAC, 250VA
Interface Cable: ..... RS-485 Communication Cable
Beldon #8102

BINMASTER®
THE LEVEL CONTROL EXPERTS

A Division of Garner Industries / 4200 North 48th Street / Lincoln, NE 68504 / (402)434-9102 / FAX (402)434-9133



For more than thirty years, Garner Industries has manufactured the BinMaster product line of level controls.

Today our commitment continues to provide our customers with the finest products and the best service possible.

For further information on BinMaster level control products, and the name of your local distributor, call ***1-800-278-4241.***

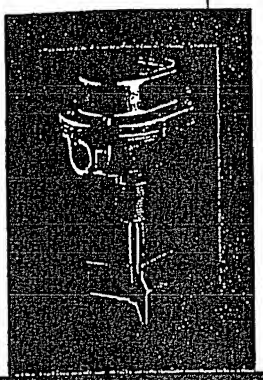
BINMASTER
THE LEVEL CONTROL EXPERTS

NO POSTAGE
NECESS
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 736 LINCOLN NE

POSTAGE WILL BE PAID BY ADDRESSEE

BINMASTER
THE LEVEL CONTROL EXPERTS
Division of Garner Industries
4200 N 48TH STREET



GR, GRE, GRX

APPLICATIONS

Reliable point level detection for bulk solids including powder, pellet and granular materials

Use in bins, vessels, chutes and conveyers

Material density from 5 lbs./cu.ft. to over 100 lbs./cu.ft.

Feed, seed, grain, food, sand, gravel, concrete, aggregate, plastic, chemical, coal, and other materials

FEATURES

Rugged construction and simple, dependable design

De-energizing motor for extended operation life

Three bearing drive shaft assembly reduces wear and increases reliability

Various voltages available

Explosion proof model

Terminal strip for quick easy installation

Interchangeable with other rotary units

SPECIFICATIONS

Power Requirements: 120/240 VAC

Output Contacts: SPDT 15 Amp 120 VAC

Ambient Operating Temperature: -40°F to +300°F, (-40°C to +149°C)

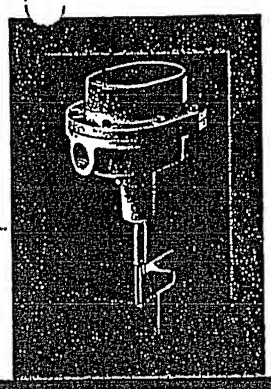
Pressure: 1/2 micron, 30 PSI

Approvals & Certifications (available): listed for Class I, Groups C & D and Class II Groups E, F & G Hazardous Locations. Enclosure Type 4,5,7,9 & 12

Enclosure: Die cast aluminum

Mounting: 1 1/4" NPT

Shaft and components: 316 SS



GRD, GRDX

APPLICATIONS

Reliable point level detection for bulk solids including powder, pellet and granular materials

Use in bins, vessels, chutes and conveyers

Material density from 5 lbs./cu. ft. to over 100 lbs./cu. ft.

Feed, seed, grain, food, sand, gravel, concrete, aggregate, plastic, chemical, coal, and other materials

FEATURES

Fail-Safe circuitry eliminates spills and process shortages from power failures

Rugged construction and simple, dependable design

De-energizing motor for extended operation life

Three bearing drive shaft assembly reduces wear and increases reliability

Multiple voltages

Explosion proof model

Interchangeable with other rotary units

SPECIFICATIONS

Power Requirements: 120/240 VAC; 24/ 12 VDC

Output Relay: DPDT 10 Amp 250 VAC

Ambient Operating Temperature: Electronics, -40°F to +185°F, (-40°C to +85°C)

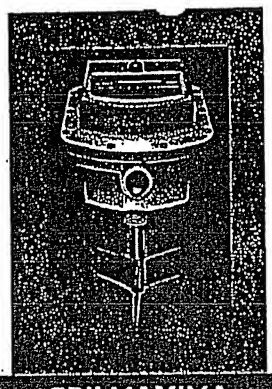
Pressure: 1/2 Micron, 30 PSI

Approvals & Certifications (available): listed for Class I, Groups C & D and Class II Groups E, F, & G Hazardous Locations. Enclosure Type 4X, 5, 7, 9 & 12

Enclosure: Die cast aluminum, USDA Approved powder coat finish

Mounting: 1 1/4" NPT

Shaft and components: 316 SS



GRII MAXIMA

APPLICATIONS

Reliable point level detection for bulk solids including powder, pellet and granular materials

Use in bins, vessels, chutes and conveyers

Material density from 5 lbs./cu. ft. to over 100 lbs./cu. ft.

Feed, seed, grain, food, sand, gravel, concrete, aggregate, plastic, chemical, coal, and other materials

FEATURES

Fail-Safe circuitry eliminates spills and process shortages from power failures, motor or gear failures

Visual LED indicates sensor status: uncovered, covered and fault conditions

Normal and fault status contact

De-energizing motor for extended operation life

Three bearing drive shaft assembly reduces wear and increases reliability

Multiple voltages

Interchangeable with other rotary units

SPECIFICATIONS

Power Requirements: 24/120/240 VAC

Output Relay: DPDT 10 Amp 250 VAC; SPDT supervisory 10 Amp 250 VAC normal, fault

Ambient Operating Temperature: Electronics, -40°F to +185°F, (-40°C to +85°C)

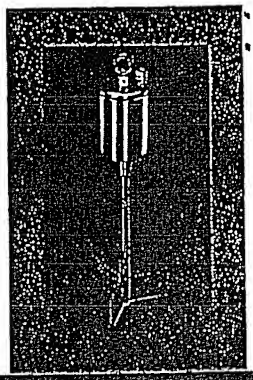
Pressure: 1/2 Micron, 30 PSI

Approvals & Certifications (available): listed for Class II, Groups E, F, & G Hazardous Locations. Enclosure Type 4X, 5, 9 & 12

Enclosure: Die cast aluminum, USDA Approved powder coat finish

Mounting: 1 1/4" NPT

Shaft and components: 316 SS



TILT SWITCH

APPLICATIONS

Reliable high level detection for dense bulk solids

Use in bins, vessels, chutes, silos or over conveyers and open pits where conventional level devises can not be mounted

Material density of 15 lbs./cu. ft. and greater

Grain, sand, gravel, concrete, aggregate, coal, and other materials

FEATURES

Economical high level point detection

Rugged construction and easy installation

Simple design with one moving part

Switch activated at 15 degrees

Stainless steel paddle options available

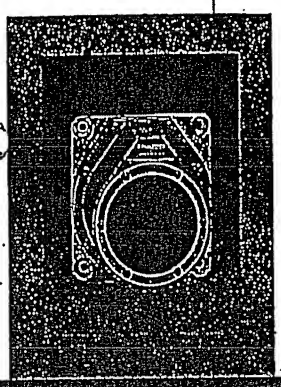
SPECIFICATIONS

Switch Ratings: 15 Amps @125, 250 or 480 VAC, 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC, 1/2 A @ 125 VDC, 1/4 A @ 250 VDC

Operating Temperature: -40°F to +300°F, (-40°C to +149°C)

Housing: Die cast aluminum

Mounting: Suspended by flexible hanger



BM-45, BM-65

Reliable point level detection for free flowing dry materials

Use in bins, vessels, and some plugged chute applications

Material density from 20 lbs./cu. ft. to 60 lbs./cu. ft.

Feed, seed, grain, food, rubber, plastics, light powders, granules and other materials

Rugged construction and simple design, very economical point level detection

Neoprene or silicone diaphragm material, variable sensitivity

Internal or external mount

Multiple voltages

Explosion proof

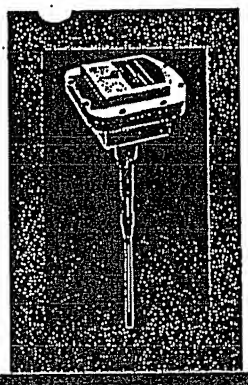
Switch Ratings: 15 Amps @125, 250 or 480 VAC, 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC, 1/2 A @ 125 VDC, 1/4 A @ 250 VDC

Operating Temperature: -40°F to +300°F, (-40°C to +149°C)

Approvals & Certifications (available): listed for Class II, Groups E, F, & G

Housing Enclosure: Die cast aluminum

Mounting: Internal or External, 16 ga. galvanized mounting plate



PRO I

Point level detection and process control for solid, liquid and slurry materials

Use in bins, vessels, tanks, chutes and conveyers

Material density over 10 lbs./cu. ft.

Plastics, chemicals, coal/fly ash, concrete, food ingredients, pharmaceuticals, feed/grain and many more materials

"Quick-Set" simple calibration, adjustable 1-10 Picofarads

PRO-Shield compensates for material build-up on probe, sticky and corrosive applications

Fail-Safe, switch selectable high/low

Adjustable time delay to 10 seconds

Optional sensing probes: coated, food grade, flush mount, solid and flexible extension

Visual LED indicates sensor status: uncovered, covered, and power failure

Power Requirements: 120/240 VAC, 50/60 Hz ±15%

Output Relay: DP/DT 10 Amp at 250 VAC

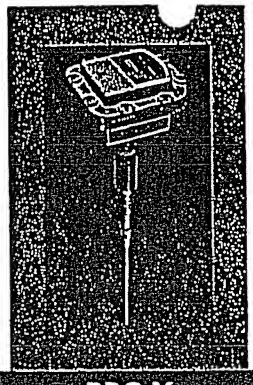
Ambient Operating Temperature: Electronics, -40°F to +185°F, (-40°C to +85°C)

Pressure: 500 PSI

Approvals & Certifications (available): Enclosure Type 4X, 5, & 12

Housing Enclosure: Cast aluminum enclosure with bolt-on cover and USDA approved finish

Mounting: 1 1/4" NPT Standard; 3/4" NPT 316 SS Optional



PRO X

Point level detection and process control for solid, liquid and slurry materials

Use in bins, vessels, tanks, chutes and conveyers where explosion rated sensor is necessary

Material density over 10 lbs./cu. ft.

Plastics, chemicals, coal/fly ash, concrete, food ingredients, pharmaceuticals, feed/grain and many more materials

"Quick-Set" simple calibration, adjustable 1-10 Picofarads

PRO-Shield compensates for material build-up on probe, sticky and corrosive applications

Fail-Safe, switch selectable high/low

Adjustable time delay to 10 seconds

Optional sensing probes: coated, flush mount flexible extension

Internal LED indicates material in contact with probe

Power Requirements: 120/240 VAC, 50/60 Hz ±15%

Output Relay: DP/DT 10 Amp at 250 VAC

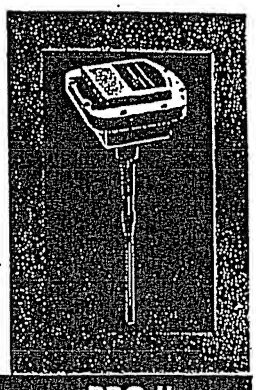
Ambient Operating Temperature: Electronics, -40°F to +185°F, (-40°C to +85°C)

Pressure: 500 PSI

Approvals & Certifications (available): Enclosure Type 4X, 5, 7, 9 & 12; Explosion Proof for Class I Group C & D; Class II E, F, & G

Housing Enclosure: Cast aluminum enclosure with bolt-on cover and USDA approved finish

Mounting: 1 1/4" NPT Standard; 3/4" NPT 316 SS Optional



PRO II

Point level detection and process control for solid, liquid and slurry materials

Use in bins, vessels, tanks, chutes and conveyers where flush mount sensor is necessary

Material density over 10 lbs./cu. ft.

Plastics, chemicals, coal/fly ash, concrete, food ingredients, pharmaceuticals, feed/grain and many more materials

"Quick-Set" simple calibration, adjustable 1-10 Picofarads

PRO-Shield compensates for material build-up on probe, sticky and corrosive applications

Fail-Safe, switch selectable high/low

Adjustable time delay to 10 seconds

Optional sensing probes: coated, food grade, flush mount, solid and flexible extension

Internal LED indicates material in contact with probe

Power Requirements: 120/240 VAC, 50/60 Hz ±15%

Output Relay: DP/DT 10 Amp at 250

Ambient Operating Temperature: Electronics, -40°F to +185°F, (-40°C to +85°C)

Pressure: 500 PSI

Approvals & Certifications (available Enclosure Type 4X, 5, & 12

Housing Enclosure: Cast aluminum enclosure with bolt-on cover and US approved finish

Mounting: 1 1/4" NPT Standard; 3/4" NPT 316 SS Optional

PRO REMOTE	BINBOB	SMARTBOB/IMS	AIR PADS
Point level detection and process control for solid, liquid and slurry materials	Continuous "on-demand" level measurement for solid, liquid and slurry materials. Operates using electro-mechanically controlled sensing probe	Continuous "on-demand" level measurement and Inventory Management System (IMS) for solid, liquid and slurry materials. Microprocessor based, electro-mechanical level measurement device	Eliminate packing and maintain flowability of finely-ground dry bulk materials
Use in bins, vessels, tanks, chutes and conveyers with high temperature/ high vibration conditions; electronics may be located up to 75' from sensing probe	Indoor and outdoor applications in bins, vessels, and tanks measuring up to 150'	IBM compatible, PC based IMS software controls up to 30 remote sensing units and provides graphical display of material measurements and inventory history by distance, weight, and percentage in English and metric units. Wiring distance up to 4,000 ft.	Indoor and outdoor applications in bins, and storage vessels
Material density over 10 lbs./cu. ft.	Material density over 5 lbs./cu. ft., not affected by dust or vapor	Plastics, chemicals, coal, concrete, food ingredients, pharmaceuticals, feed/grain, aggregates and many more materials	Use in high temperature, corrosive applications
Plastics, chemicals, coal/fly ash, concrete, food ingredients, pharmaceuticals, feed/grain and many more materials	Plastics, chemicals, coal, concrete, food ingredients, pharmaceuticals, feed/grain, aggregates and many more materials		Flour, seeds, grain, flakes, sawdust, cement, PVC resin, fly ash, carbon black, lime, sand, cornstarch, gypsum, sugar and other materials
"Quick-Set" simple calibration, adjustable 1-10 Picofarads	Fast, accurate measurement without calibration	High speed, accurate measurement without calibration, nylon coated stainless steel cable	Special design provides two action flow aid through aeration and vibration
PRO-Shield compensates for material build-up on probe, sticky and corrosive applications	Simple operation with advanced digital circuitry	Advanced design with built-in measurement reliability for one or many vessels	Requires fewer pads than diffuser type because of unique design
Fail-Safe, switch selectable high/low	Rugged mechanical construction; optional sensing probes	Rugged mechanical construction; optional sensing probes	Uses high or low pressure
Adjustable time delay to 10 seconds	Console option, monitor up to 12 remote sensors, programmable bin height, LED readout	Explosion-proof rating	Not affected by moisture or temperature
Optional sensing probes: coated, flush mount	PLC interface option for direct operation of remote sensors without console	RS 485 Protocol available for direct PLC integration	Self-cleaning
Internal LED indicates material in contact with probe			Simple to install in any type vessel
Remote Probe status contacts			Suitable for abrasive material
Power Requirements: 120/240 VAC, 50/60 Hz ±15%	Power Requirements: 120 VAC, 50/60 Hz	Power Requirements: 16 VAC 50/60 Hz	Durable molded silicone rubber construction
Output Relay: DP/DT 10 Amp at 250 VAC	Ambient Operating Temperature: Electronics, -40°F to +185°F, (-40°C to +85°C), Optional heater for below -30°F	Ambient Operating Temperature Electronics with Heater: -40°F to +185°F, (-40°C to +85°C)	Stainless Steel Center Shaft
Status Contacts: 3 Amps 240 VAC	Measurement Range: 150'	Measurement Range: 150'	Rated to 250°F (121°C)
Ambient Operating Temperature: Electronics, -40°F to +185°F, (-40°C to +85°C)	Measurement Rate: 1' per second	Measurement Rate: 2.5' per second	Air pressure from 5 PSIG to 60 PSIG
Pressure: 500 PSI	Resolution: .1 ft.	Accuracy: 0.25%	Food grade material available
Approvals & Certifications (available): Intrinsically safe, Enclosure Type 4X, 5, & 12	Enclosure: Cast aluminum frame and weather tight polyethylene cover	Mounting: 3"- 8 NPT	
Housing Enclosure: Cast aluminum enclosure with bolt-on cover and USDA approved finish	Mounting: 3" NPT stand pipe and aluminum flange	Enclosure: Die cast aluminum	
Mounting: 1 1/4" NPT Standard; 3/4" NPT 316 SS Optional		Approvals & Certifications (available): Enclosure Type 4X, 5, 7, 9, 12, Explosion Proof Class I Group C & D, Class II Group E, F, & G	

Title: _____

Company: _____

Address: _____

City: _____

State: _____ Zip: _____

Phone: _____

FAX: _____

Mail Today or Fax to: (402) 434-9133

Order Information

To place an order or for technical assistance, please call

1-402-434-9102 Or **1-800-278-42**

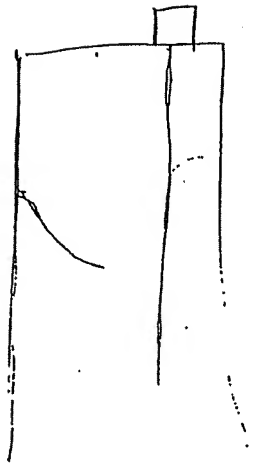
Or FAX

1-402-434-9133

BinMaster products are sold worldw through our stocking distributor netw Call us today for the name of your BinMaster distributor.

BINMASTER
THE LEVEL CONTROL EXPERTS
Division of Garner Industries
4200 N 48TH STREET
LINCOLN NE 68504-9940

12



BINMASTER®
THE LEVEL CONTROL EXPERTS

A Division of Garner Industries / 4200 North 48th Street / Lincoln, Nebraska 68504 / 1-800-278-4241 / (402) 434-9102 / FAX (402) 434-9133

B-36-1195-3M

EXHIBIT E

Peter R. Wells

Apptech Engineered Systems

DRY BULK MATERIAL HANDLING
SYSTEMS & EQUIPMENT

ENGINEERED SYSTEMS INC.
t/a APPLIED TECHNICAL SALES

P.O. Box 1330, 5189 Stump Road
Plumsteadville, PA 18949
Phone: 215-766-0200 Fax: 215-766-2455

Apptech ENGINEERED SYSTEMS, INC.

System and Components
for
Handling Bulk Solids

Pneumatic Convey
Mechanical Convey
Automatic Batching
Controls
Storage Silos
Flow Aids
Mixing & Blending
Total Turnkey Systems
Dust Collectors

OIPE SCTTT
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

April 8, 1996

ONO TRANSPORT SERVICES
P.O. Box 74
Ono PA 17077

Attn: Frank Cortanzo
Vice President and General Manager

Dear Frank:

As a result of our meeting on March 28, I have done some additional investigation into the silo communications system we discussed and have the following answers to your questions:

1. It is possible to have the "black boxes" call your PC automatically.

   A. One advantage of this idea is that calls could be made at night.

   B. Also, it would not lock up during the day.

   C. A disadvantage could be that a two way line to each box would be required, which would be more costly.

2. The availability of printools and spread sheets is almost limitless. All we need do is write it into the software.

3. The ideas of modeming (if that's a good word) into your customers PC and inturn to your PC has several disadvantages:

   A. It adds another step which could add to cost.

   B. It could bring up the question of who owns the information which might get a little sticky.

4. We can work-up a simple demo unit to show your customers at some type of seminar.

Let's continue dialogue on this project. Give me a call after you have had a chance to digest the above.

Very truly yours,

Peter R. Wells

Any purchase order issued as a result of this quote is made expressly subject to the terms and conditions attached hereto in lieu of any conflicting terms proposed by the purchaser.

5189 Stump Road, Plumsteadville, PA 18949, Phone (215) 766-0200, Fax (215) 766-2455

AES AIR ENGINEERING SALES CORP.

(717) 474-5944
FAX (717) 474-0788

P.O. BOX 166
MOUNTAINTOP, PA 18707-0166

JOHN F. USAVAGE

Air Pollution Control · Material Handling · Process Equipment · Weighing and Packaging

AIR ENGINEERING SALES CORPORATION

P.O. BOX 166
MOUNTAINTOP, PA 18707-0166

1 800 355-1263

(717) 474-5944
FAX (717) 474-0788

REPRESENTING:

Amerex	Southern Environmental	Sturtevant
Ceilcote	Int'l Industrial Fan	Gustafson
Interel	Singer Safety	Binmaster
VIC	Ross Cook	Pulva

Amerex Industries, Inc. ..... Woodstock, Georgia
Baghouses, Gas Cooling/Heat Recovery, Scrubbers, Cyclones, Cartridge Filters, Stacks, Expansion Joints, Pneumatic Conveying and Component Parts.

Southern Environmental, Inc. ..... Pensacola, Florida
Precipitators (Wet & Dry Electrostatic) - Featuring SEI Style Rigid Electrodes. Refurbishment, Upgrade, Repair Services and Component Parts for all Makes.

Interel Environmental Technologies, Inc. ..... Englewood, Colorado
Dry Scrubbing Systems (IDAP-II), Self-Cleaning Flat-Tube Heat Exchangers, Luhr Flat-Bag Fabric Filter Systems, Self-Contained Packed Bed Scrubbers.

VIC Environmental ..... Minneapolis, Minnesota
Regenerative **Carbon Adsorption / Desorption Systems** - for VOC recovery.

Ceilcote Air Pollution Control ..... Cleveland, Ohio
Wet Scrubbers(Packed Bed & Sieve Tray Designs),Ionizing Wet Scrubbers(IWS), **FRP Fans** (Centrifugal & Axial), Venturi's, Cyclones and Packed Tower Products.

International Industrial Fan, Inc. ..... South Boston, Virginia
Industrial **Fans & Blowers** - Centrifugal / Axial.

Singer Safety Co. ..... Chicago, Illinois
Noise Control - Complete Line Of Industrial Products and Enclosures.

Ross Cook, Inc. ..... Los Angeles, California
Central **Vacuum Cleaning Systems**, Pneumatic Tube Systems and Centrifugal **Blowers / Exhausters.**

Binmaster .....Lincoln, Nebraska
Point and Continuous Level Controls for Bulk Solid and Liquid Materials.

Gustafson, Inc. ..... Dallas, Texas
Automatic Sampling Systems for Free-Flowing Solids, Slurries, and Viscous Liquids - under Positive or Negative Pressures.

Pulva Corporation ..... Saxonburg, Pennsylvania
Pulverizers (Hammermills), Parts & Rebuilding Services for All Brands.

Sturtevant Inc. ..... Boston, Massachusetts
Powder Processing Mills (Air Classifying, Jet Energy & Impact Types).
ALLGAIER **Screeners.**

Air Pollution Control Equipment · Material Handling · Process Equipment · Weighing and Packaging

EXHIBIT F

OIPE
MAR 1 3 2001
PATENT & TRADEMARK OFFICE
SCOTT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David B. Wallace

Serial No: 09/167,379 Examiner: Hartman Jr., R.

Filed: 10/06/1998 Group Art Unit: 2786

For: BULK INVENTORY NETWORK SYSTEM (BINS)

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

AFFIDAVIT OF MICHAEL KARPA

I, MICHAEL KARPA, state as follows:

1. All of the events outlined below occurred in the United States of America.

2. On May 30, 1996, I was approached by Dave Wallace regarding the implementation of his system for monitoring a dry bulk material quantity at a remote site that included a detector for producing a first output signal corresponding to an existing material quantity; a remote telemetry unit for receiving the first output signal from the detector and producing a second output signal corresponding to the first output signal; and a computer coupled to the remote telemetry unit for receiving the second output signal from the remote telemetry unit. The computer would include software for determining the existing material quantity and a projected usage rate for the existing material quantity based on the second output signal.

3. On the week of June 3, 1996, I made a sales call at J.P. Donmoyer in Ono, PA. I was at that time a manufacturer's representative for Kistler Morse, and an employee of Magyar Associates. I presented various types of leveling systems as well as options to retrieve data from a site and transmit that data back to a central computer where the data could be displayed for the logistical purpose of consistent product replenishment in

accordance with the conception of Dave's invention. I advised Dave that I had experience with a private engineering company, Tri-Star, Inc., who would have the ability to design the complete system to link into either a Kistler Ultra Sonic and/or Kistler load cell detector. I agreed to arrange a meeting with Tri-Star.

4. During the week of June 17, 1996, a second meeting was held at J.P. Donmoyer in Ono, PA including the same individuals as the May 20, 1996 meeting, and also including Walter Maidl, Vice President Sales, Allen Baumbach II, Project Engineer, Tri-Star, Inc., Middletown, PA . The preferred embodiment of Dave's invention was discussed in detail. Tri-Star agreed to produce a working remote telemetry unit (RTU) to be installed at a customer site for an experimental implementation of Dave's invention. The RTU would be able to take a standard 4/20 ma read based on preprogrammed times and transmit that data, via signal line, with no restrictions on distance. A modified SCADA program would be installed in a computer at J.P. Donmoyer which would translate the data in a historical trend analysis, and provide comparisons of variable flow rate changes.

5. On June 12, 1996, I visited the Pennsylvania Steel Technologies (PST) facilities located at Steelton, Pennsylvania, to verify the availability of existing 4-20 line for the purpose of installing a prototype embodiment of Dave's invention for test ("the PST project"). It was determined that there was a need to run 50 yards of signal line to make on-site modem connection.

6. On or about July 3, 1996, Tri-Star Inc., provided a proposal detailing the installation of Dave's invention for the PST project. I had agreed, as a part of this proposal, to provide the I/O Operating System from Control Micro Systems.

7. On or about August 1, 1996, I reviewed a proposal to include an additional silo for injection carbon in the PST project in order to test multiple silos at the PST site.

8. On or about August 27, 1996, Dave Wallace raised concerns over delivery delays of required components. Some reasons for delay on the PST project included:(i) VS/2 didn't ship yet, and (ii) the PST site also required modem activation. I provided a September 27th delivery date for the VS/2 equipment needed for the PST installation.

9. On or about October 28, 1996, the Kistler Morse microcells arrived at the PST site.

10. On or about November 15, 1996, Allen Baumbach II committed to an installation of Dave Wallace's invention at PST Steelton by the following week.

11. On or about December 12, 1996, Tri-Star moved on site at PST Steelton, and the installation of an experimental embodiment of Dave Wallace's invention was begun. Training issues related to the software were encountered at that time.

12. By December 30, 1996, Dave Wallace's invention had been installed and functioning at PST Steelton on a limited basis, but not yielding Dave's expected results. The modem appeared to be hanging up and not closing, with future reads of data not being obtained. Tri-Star advised that the signal line could be the source of the problems. Considerable disagreement occurred among the parties involved as to why Dave Wallace's invention was not functioning properly. Tri-Star agreed to attempt multiple solutions to correct the problems.

13. On or about January 14, 1997, Tri-Star could not resolve the modem problem with the unit installed at that time. Tri-Star suggested that the problems were with the hardware which should be replaced. In addition to the modem issues, the time on the computer installed and programmed by Tri-Star was displaying incorrect times.

14. On or about January 27, 1997, another complete replacement unit was ordered by Tri-Star, through me.

15. On or about January 30, 1997, personnel at Control Microsystems advised that they believed that the problems encountered at the PST site were the result of signal line noise. Employee John Martz tested signal line.

16. On or about February 12, 1997, Tri-Star installed a VS/2 unit. Some improvement was noted in performance of the system, but disruptions of data flow from the on-site remote telemetry unit (RTU) were still encountered and reported to Dave Wallace.

17. On or about February 24, 1997, the same problems with the new hardware (wrong time, disconnects, corrupted data) were reported to Dave Wallace. I had instructed one of the technicians to get involved with Tri-Star to resolve these recurring problems.

18. On or about February 28, 1997, personnel from Tri-Star, found a faulty RS-232 adaptor for the VS/2. They advised that replacement of this component should correct current problems reported to me.

19. On or about April 1, 1997, as a result of the foregoing correction, the system's performance improved. However, when the computer self-booted it would no longer collect data. This was an issue in the off hours at PST and the J.P. Donmoyer facility, when the system was not manned. Allen Baumbach of Tri-Star advised Dave Wallace that he thought that the problem is associated with the Wave Conversion on the Win 11 modem Tri-Star had installed. Allen suggested to replace the modem to correct the foregoing problem.

20. In and around May, 1997, the system performance was still inconsistent in that it worked fine for a period of time, and then for no apparent reason disconnected at the site, with no additional data being transmitted.

21. In and around June, 1997, a second silo of injection carbon was added to the PST RTU. Control screens for the software were programmed at J.P. Donmoyer Operations at Ono, Pennsylvania. This installation provided Dave Wallace the opportunity to test two silos over the same RTU. This

would aid him in evaluating problems still occurring with the original site installation.

22. In and around October, 1997, data reads from the second silo of injection carbon were inconsistent. There were high swings in volume displayed on the screens, which were unrealistic. I was asked by Dave Wallace to evaluate the Kistler Morse monitoring system.

23. In and around December, 1997, I discussed the problems associated with the Tri-Star installation at PST with Dave Wallace, and offered some alternative contact suggestions.

24. On or about January, 1998, I met with Dave Wallace informed me that Steve Lowry would be joining the team to help correct some of the problems encountered at the existing implementation of his invention at PST.

25. On or about April, 1998, Dave Wallace was provided with an engineering report outlining Steve Lowry's recommendations for the correction and proper implementation of Dave's bulk inventory networking system invention at PST in Steelton, Pennsylvania, Nucor, Inc., of Darlington, South Carolina, and at New Jersey Steel.

26. Between May 1, 1998 and September, 1998, Dave, Steve and I undertook to implement Steve's recommendations for operation of Dave Wallace's invention as outlined in his report of April 13, 1998, at the PST project, the Nucor, South Carolina location, and at New Jersey Steel.

27. During the months of August and September 1998, the updated version of the Lookout software and the redesigned remote telemetry unit were installed at the New Jersey Steel and Nucor installations.

28. On September 19, 1998, the implementation of Dave Wallace's invention at the Nucor, South Carolina facility fully functioned according to his express expectations as discussed on May 30, 1996.

29. In and around November, 1998, the implementation of Dave Wallace's invention at the PST facility fully functioned according to his express expectations as discussed May 30, 1996.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issuing thereon.

Date: March 6, 2001

Michael Karpa

HBG\69622.1

EXHIBIT G

TRI-STAR INC.
300 VINE ST. MIDDLETOWN,PA. 17057
PHONE (717) 944-1234 - FAX (717) 944-5401

Quotation No. Q690WM-96

Page 1 Of 4

Date July 3, 1996

Per: Bulk Inventory Monitoring

To: Jonas P. Donmoyer Inc.
Box 74
Ono, Pa. 17077

ATTN: Mr. David B. Wallace

QTY	DESCRIPTION

Dear Mr. Wallace,

We are pleased to propose a system for monitoring bulk inventory at your customer's locations. This system is comprised of a personal computer at the master site and remote terminal units (RTU'S) at the customer's location.

The master site will interrogate the RTU'S via standard dial-up telephone lines. Frequency of interrogation will be selectable by you. The RTU'S will report actual tank levels, in engineering units, plus any low alarm conditions selected by you. The RTU will initiate a call to the master site any time the low alarm set point is reached. Low alarm condition will be displayed by a flashing icon on the graph.

The master site will display a real time graph (x axis) with point and trend level information (y axis) thereon. In addition, the graphics display will contain any amount of text as selected by you for each customer and each product. We have prepared a sample graphic display (enclosed) for your review. Historical and trend data may be accumulated up to the capacity of the PC hard disc and/or transferred to floppy discs for permanent storage.

Master Site System Requirements:

1. Master site will be a personal computer system furnished by J.P. Donmoyer Inc. The PC system should include:
   A. IBM compatible PC, Pentium 133, 16 Mb RAM, 1.2 Gb hard disc drive with Windows 95 installed, PCI VGA video card with 2 Mb RAM and an internal modem.
   B. 14" (or larger) VGA monitor with .28" dot pitch.
   C. A suitable dot matrix printer.
   D. As an option, a UPS that will provide 15-30 minutes back-up in case of power outage.

2. Tri-Star Inc. will provide software, system design, programming start-up and training. Software will consist of:
   A. Control Microsystems Lookout Runtime package with 200 I/O capacity - Provides system MMI.
   B. PC Anywhere package - Allows the system to be interrogated from any other compatible PC or Laptop connected to a dial up modem.
   C. WIN 911 package - provides for alarm messages to be dialed out from the master site during designated hours to a selection of phone numbers.

TRI-STAR INC.
300 VINE ST. MIDDLETOWN,PA. 17057
PHONE (717) 944-1234 - FAX (717) 944-5401

Quotation No. Q690WM-96

Date July 3, 1996

To: Jonas P. Donmoyer Inc. cont'

Per: Bulk Inventory Monitoring

QTY	DESCRIPTION

Remote Site System Requirements

1. For the Bethlehem Steel Plant, Steelton, Pa., Tri-Star Inc. will provide a Control Microsystems Telesafe VS/2 RTU (specifications enclosed)
2. We will physically install the RTU, connect the existing telephone line and connect the unit power via existing duplex receptacle at the site location.
3. We will program the RTU for two (2) 4-20 MADC inputs, anticipating that a Kessler-Morse strain gauge system will be installed on the second lime silo during the next several months.

NOTE: Tri-Star Inc. is not permitted to install the necessary signal cable between the lime silos and the RTU due to Bethlehem Steel Union regulations. Bethlehem Steel will advise J.P. Donmoyer directly, concerning this installation cost.

PRICE

1. Software and technical services for master site---------- $7,508.00
2. Equipment and technical services for the remote site---------- $2,431.00

$7508.00 (200 I/O) | $2,431 | Kimmel $640
- 610.00 (100 I/O) | | SCREEN

$6,898
$2,431
$640
$9,969

TRI-STAR INC.
300 VINE ST. MIDDLETOWN,PA. 17057
PHONE (717) 944-1234 - FAX (717) 944-5401

Quotation No. Q690WM-96

Date July 3, 1996

To: Jonas P. Donmoyer Inc. cont'

Per : Bulk Inventory Monitoring

QTY	DESCRIPTION

TAXES: Applicable sales or use taxes, fees, duties, permits and licenses are not included.

TERMS: 100% net thirty (30) days from date of invoice. Balances overdue are subject to a service charge of 2% per month.

FREIGHT: FOB shipment point with freight prepaid and included to jobsite.

SHIPMENT: 8 - 10 weeks from receipt of order, complete data and authorization to proceed with manufacturing.

VALIDATION: Price quoted is firm provided:

1. Written acceptance is received at Tri-Star within thirty (30) calendar days of the bid date.
2. Shipments delayed by the buyer or his agents will be escalated at a rate of 2% per calendar month, compounded, of the value of the unshipped portion.

Sincerely,

Walter J. Maidl
Vice President, Sales
Tri-Star Inc

TRI-STAR INC.
300 VINE ST. MIDDLETOWN,PA. 17057
PHONE (717) 944-1234 - FAX (717) 944-5401

Quotation No. Q690WM-96

Date July 3, 1996

To: Jonas P. Donmoyer Inc. cont'

Per : Bulk Inventory Monitoring

QTY	DESCRIPTION

TAXES: Applicable sales or use taxes, fees, duties, permits and licenses are not included.

TERMS: 100% net thirty (30) days from date of invoice. Balances overdue are subject to a service charge of 2% per month.

FREIGHT: FOB shipment point with freight prepaid and included to jobsite.

SHIPMENT: 8 - 10 weeks from receipt of order, complete data and authorization to proceed with manufacturing.

VALIDATION: Price quoted is firm provided:

1. Written acceptance is received at Tri-Star within thirty (30) calendar days of the bid date.
2. Shipments delayed by the buyer or his agents will be escalated at a rate of 2% per calendar month, compounded, of the value of the unshipped portion.

Sincerely,

Walter J. Maidl
Vice President, Sales
Tri-Star Inc.

All orders shall be made out to the Compa... and shall be subject to acceptance by us at our plant.

1. CONSTRUCTION AND LEGAL EFFECT
Our sale to you will be solely upon the terms and conditions set forth herein. They supersede and reject any conflicting terms and conditions of yours, any statement to yours to the contrary notwithstanding. Exceptions to any of our terms and conditions must be contained in a written or typed (not printed) statement received from you; we shall not be deemed to have waived any of our terms and conditions or to have assented to any modification or alteration of such terms and conditions unless such waiver or assent is in writing and signed by an authorized officer.
No representation of any kind has been made by us except as set forth herein; this agreement conclusively supersedes all prior writings and negotiations with respect thereto and we will furnish only the quantities and items specifically listed on the face hereof; we assume no responsibility for furnishing other equipment or material shown in any plans and/or specifications for a project to which the goods ordered herein pertain. Any action for breach of contract must be commenced within one year after the cause of action has accrued. Our published or quoted prices, discounts, terms and conditions are subject to change without notice.

2. PRICES
Unless otherwise noted on the face hereof, prices are net F.O.B. our plant and firm for sixty (30) days. Service time of a factory trained serviceman is not included and may be charged extra. The amount of any applicable present or future tax or other government charge upon the production, sale, shipment or use of goods ordered or sold will be added to billing unless you provide us with an appropriate exemption certificate.

3. CANCELLATION AND RETURNED EQUIPMENT
Orders may be cancelled only with our written consent and upon payment of reasonable and proper cancellation charges. Goods may be returned only when specifically warranted and you will be charged for placing returned goods in saleable condition, any sales expenses then incurred by us, plus a restocking charge and any outgoing and incoming transportation costs which we pay.

4. CREDIT AND PAYMENT
Unless otherwise noted on the face hereof, terms are net thirty (30) days. We may decline to deliver except for cash, or may hold goods in transit, whenever for any reason doubt as to your financial responsibility develops. Partial payments shall become due with partial shipments. Where you are responsible for any delay in shipment, the date of completion of goods may be treated by us as the date of shipment for purposes of payment, completed goods shall be held at your cost and risk, and we shall have the right to bill you for reasonable storage and insurance expenses.

5. DELIVERY
Delivery, shipment and installation dates are estimated dates only, and unless otherwise specified, are figured from date of receipt of complete technical data and approved drawings as such may be necessary. In estimating such dates, no allowance has been made, nor shall we be liable directly or indirectly for, delays of carriers or delays from labor difficulties, interruptions, strikes or stoppages of any sort, fires, accidents, failure to delay in obtaining materials or manufacturing facilities, acts of government affecting us directly or indirectly, bad weather, or any cause beyond our control or causes designated Acts of God or force majeure by any court of law, and the estimated delivery date shall be extended accordingly. We will not be liable for any damages or penalties whatsoever, whether direct, indirect, special or consequential, resulting from our failure to perform or delay in performing unless otherwise agreed in writing by an authorized officer.

6. DEFECTIVE EQUIPMENT
Providing Purchaser notifies us promptly, if within one (1) year from date of shipment equipment or parts manufactured by us fail to function properly under normal and proper use because of defects in material or workmanship demonstrated to our satisfaction to have existed at the time of delivery or because examination proves them not to be operating within the specified limits of calibration, the Company, reserving the right to either inspect them in your hands or request their return to us, will at our option repair or replace at our expense F.O.B. our plant, or give you proper credit for, such equipment or parts determined by us to be defective, if returned transportation prepaid by Purchaser. The foregoing shall not apply to equipment that shall have been altered or repaired after shipment to you by anyone except our authorized employees, and the Company will not be liable in any event for alterations or repairs except those made with its written consent. Purchaser shall be solely responsible for determining suitability for use and the Company shall in no event be liable in this respect. The equipment or parts manufactured by others but furnished by us will be repair... replaced only to the extent of the original manufacturer's ... ...ntee. No guarantee whatever is given as to electronic tubes, and the Company shall have no repair or replacement obligation as to them. THE FOREGOING OBLIGATIONS ARE IN LIEU OF ALL OTHER OBLIGATIONS AND LIABILITIES INCLUDING NEGLIGENCE AND ALL WARRANTIES, OF MERCHANTABILITY OR OTHERWISE, EXPRESS OR IMPLIED IN FACT OR BY LAW, AND STATE OUR ENTIRE AND EXCLUSIVE LIABILITY AND BUYER'S EXCLUSIVE REMEDY FOR ANY CLAIM OF DAMAGES IN CONNECTION WITH THE SALE OR FURNISHING OF GOODS OR PARTS, THEIR DESIGN, SUITABILITY FOR USE, INSTALLATION OR OPERATION. WE WILL IN NO EVENT BE LIABLE FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, AND OUR LIABILITY UNDER NO CIRCUMSTANCES WILL EXCEED THE CONTRACT PRICE FOR THE GOODS FOR WHICH LIABILITY IS CLAIMED.

7. SHIPPING
Unless you specify otherwise in writing (a) goods will be boxed or crated as we may deem proper for protection against normal handling, and extra charge will be made for preservation, waterproofing and similar added protection of goods; (b) routing and manner of shipment will be at our discretion, and may be insured at your expense, value to the stated at order price.
On all shipments F.O.B. our plant, delivery of goods to the initial carrier will constitute delivery to you and all goods will be shipped at your risk. A claim for loss or damage in transit must be entered with the carrier and prosecuted by you.

8. PATENT INFRINGEMENT
We will not be liable for any claim or infringement suits due to infringement by goods manufactured by us in the form in which we supply such goods to you and without regard to their use by you. If you notify us promptly of any such claim of infringement and, if we so request, authorize us to defend or settle any suit or controversy involving such claim, we will indemnify you against the reasonable expenses of any such suit and will satisfy any judgment or settlement in which we acquiesce, but only to an amount not exceeding the price paid to us for the allegedly infringing goods. If an injunction is issued against the further use of allegedly infringing goods, we shall have the option of procuring for you the right to use the goods, or replacing them with non-infringing goods, or modifying them so that they become non-infringing or of removing them and refunding the purchase price. The foregoing expresses our entire and exclusive warranty and liability as to patents, and we will not be liable for any damages whatsoever suffered by reason of any infringement claimed, except as provided herein. You will hold us harmless and indemnified against any and all claims, demands, liabilities, damages, cost and expense resulting from or connected with any claim of patent infringement arising out of the manufacture by us of goods in accordance with a design or specifications which you furnish us.

9. SPECIAL JIGS, FIXTURES AND PATTERNS
Any jigs, fixtures, patterns and like items which may be included in an order will remain our property without credit to you. We will assume the maintenance and replacement expense of such items, but shall have the right to discard and scrap them after they have been in use for one year without credit to you.

10. INSPECTION
Inspection of goods in our plant by you or your representative will be permitted insofar as this does not unduly interfere with our production workflow, provided that complete details of the inspection you desire are submitted to us in writing in advance.

11. RECORDS, AUDITS AND PROPRIETARY DATA
Unless otherwise specifically agreed in a writing signed by an authorized officer, neither you nor any representative of yours, nor any other person, shall have any right to examine or audit our cost accounts, books or records of any kind or on any matter, or be entitled to, or have control over, any engineering or production prints, drawings or technical data which we in our sole discretion, may consider in whole or in part proprietary to ourselves.

TRI-STAR INC.
P. O. Box 255, Middletown, Pennsylvania 17057
(717) 944-1234

3) WITH THIS CAN WE GET 1 WEEK ?
2 WEEKS ?

3) NEED DATES

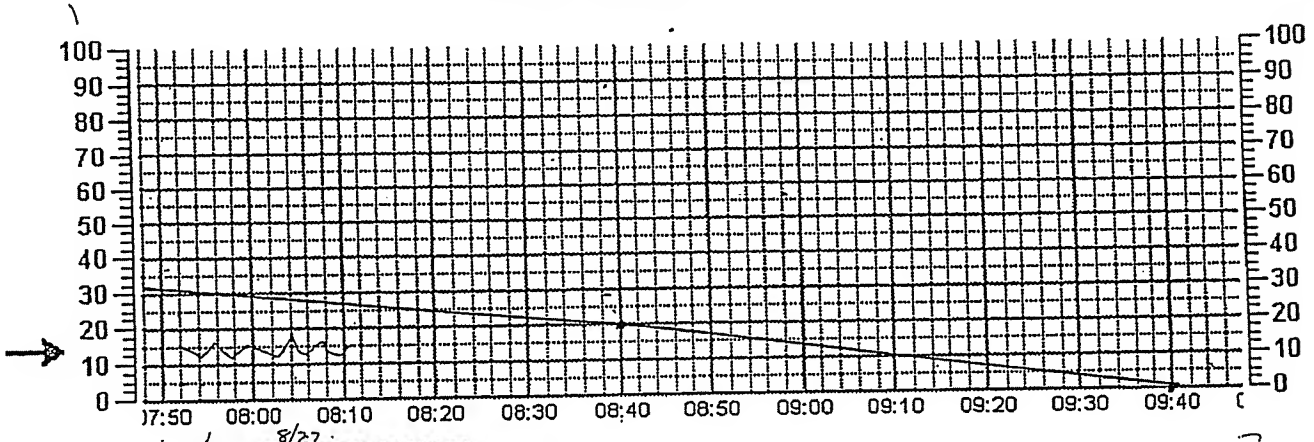
LEFT

DATE / TIME

LOCATION CODE
~~ACCOUNT NO.~~ XXXXX
~~CUSTOMER NO. XXX~~
~~PRODUCT~~ CAOH
COMMODITY

~~BETHLEHEM STEEL CORPORATION~~

LIME SILO NO.1
STEELTON, PA..



8/26 8/27

~~CURRENT VALUE~~ 0 —

BURN RATE @ TON @ HOUR

CHANGE ALARM ENABLE OR DISABLE ALARMS ?

CAPACITY - 100% = 250 TONS

SITE TELEPHONE NO. 717-939-XXXX

LO ALARM

ALARM SETTING IS 15% OF CAPACITY

HIGH ALARM

90 %

DATA HISTORICAL TREND FORM

RATE ALARM

RATE SETTING

TeleSAFE VS/2 Specifications

General Description

The VS/2 is a remote control and measurement unit capable of monitoring two analog inputs and one digital input, and controlling one digital output. It includes a Bell 103 compatible dial-up modem, optional LCD display, and nickel-cadmium rechargeable battery operation.

Specifications

Microcomputer	M50734P single chip CMOS microcomputer (enhanced 6502 software compatible) operating at 7.37 MHz.
Memory	32K RAM with lithium battery back up. Data retention over 2 years with power removed. 64K EPROM for operating system and application program storage. 128 byte non-volatile serial RAM for configuration and calibration data.
Standard Language	TeleSAFE BASIC
I/O capability	2 Analog inputs 1 Digital output (form C relay) 1 Digital input 1 counter
Analog Inputs	8 bit resolution 250 ohms current sense resistor built in Calibrated for 20 mA at full scale. Single-ended, referenced to transmitter power supply. 24 VDC, 50 mA transmitter loop supply. Accuracy +/– 0.4% Temperature stability +/– 0.4%
Internal Analog Inputs	NiCad battery voltage and telephone line voltage. 8 bit resolution. Accuracy +/– 5%.
Digital Inputs	24 Volts, AC or DC 115 Volts, AC or DC option. Input typically on at 50% of rated range. Isolated input. 5 to 10 mA current required.
Digital Output Contacts	0.4 Amp, 125 VAC 2 Amp, 30 VDC Normally Open and Normally Closed contacts available
Real-Time Support	32 software timers (0.1 seconds to 19 days) 1 duty cycle (PWM) outputs 27 priority interrupts (BASIC only)

	Hardware watch dog timer resets VS/2 after software failure.
Clock/Calendar	accuracy 1 minute/month Provides year, month, day, day of week, hours, minutes and seconds
Display	4 characters LCD display available as an option with 0.7" character height. Heater available as an option.
Field Terminations	Terminal blocks accommodate solid or stranded wire up to No. 14 AWG.
RS-232 Port Option	Communication rates of 19200, 9600, 4800, 2400, 1800, 1200, 600, and 300 baud, 7 or 8 data bits, even, odd or no parity, XON/XOFF handshaking optional.
	external RS-232 module for programming only.
Modem	300 Baud, FSK, Bell 103 compatible. USOC RJ11 4 contact telephone jack for connection to public switched (dial up) telephone network. Ring detection. DTMF tone generator for dialing. Telephone line monitor allows sharing of line with standard telephone.
Protection	Transient suppressors on analog inputs, and the 24V transmitter power supply. Power input is fuse and transient protected.
Power Requirements	16 VAC at 0.24 Amps supplied by external transformer or 24 VDC at 0.16 Amps supplied by external DC power supply. Low temperature option can result in surge currents greater than 1 Amp.
	Internal nickel-cadmium battery provides over one hour operation after power removal. Nickel-cadmium trickle charging (3 mA). Charge time is 2 days at room temperature. Charging current is reduced at low temperatures.
Physical Size	5" wide by 7" high by 3" deep
Temperature Range	–40 to 65 degrees C (not including nickel-cadmium battery and LCD display - see Low Temperature option).
Humidity Range	0 to 95% RH, non-condensing.
Low Temperature Option	Heaters supplied for the nickel-cadmium battery and the LCD display allows operation down to –40 degrees C.

TeleSAFE VS/2 Specifications

General Description

The VS/2 is a remote control and measurement unit capable of monitoring two analog inputs and one digital input, and controlling one digital output. It includes a Bell 103 compatible dial-up modem, optional LCD display, and nickel-cadmium rechargeable battery operation.

Specifications

Microcomputer	M50734P single chip CMOS microcomputer (enhanced 6502 software compatible) operating at 7.37 MHz.
Memory	32K RAM with lithium battery back up. Data retention over 2 years with power removed. 64K EPROM for operating system and application program storage. 128 byte non-volatile serial RAM for configuration and calibration data.
Standard Language	TeleSAFE BASIC
I/O capability	2 Analog Inputs 1 Digital output (form C relay) 1 Digital Input 1 counter
Analog Inputs	8 bit resolution 250 ohms current sense resistor built in Calibrated for 20 mA at full scale. Single-ended, referenced to transmitter power supply. 24 VDC,.50 mA transmitter loop supply. Accuracy +/– 0.4% Temperature stability +/– 0.4%
Internal Analog Inputs	NiCad battery voltage and telephone line voltage. 8 bit resolution. Accuracy +/– 5%.
Digital Inputs	24 Volts, AC or DC 115 Volts, AC or DC option. Input typically on at 50% of rated range. Isolated input. 5 to 10 mA current required.
Digital Output Contacts	0.4 Amp, 125 VAC 2 Amp, 30 VDC Normally Open and Normally Closed contacts available
Real-Time Support	32 software timers (0.1 seconds to 19 days) 1 duty cycle (PWM) outputs 27 priority interrupts (BASIC only)

	Hardware watch dog timer resets VS/2 after software failure.
Clock/Calendar	accuracy 1 minute/month Provides year, month, day, day of week, hours, minutes and seconds
Display	4 characters LCD display available as an option with 0.7" character height. Heater available as an option.
Field Terminations	Terminal blocks accommodate solid or stranded wire up to No. 14 AWG.
RS-232 Port Option	Communication rates of 19200, 9600, 4800, 2400, 1800, 1200, 600, and 300 baud, 7 or 8 data bits, even, odd or no parity, XON/XOFF handshaking optional.
	external RS-232 module for programming only.
Modem	300 Baud, FSK, Bell 103 compatible. USOC RJ11 4 contact telephone jack for connection to public switched (dial up) telephone network. Ring detection. DTMF tone generator for dialing. Telephone line monitor allows sharing of line with standard telephone.
Protection	Transient suppressors on analog inputs, and the 24V transmitter power supply. Power input is fuse and transient protected.
Power Requirements	16 VAC at 0.24 Amps supplied by external transformer or 24 VDC at 0.16 Amps supplied by external DC power supply. Low temperature option can result in surge currents greater than 1 Amp.
	Internal nickel-cadmium battery provides over one hour operation after power removal. Nickel-cadmium trickle charging (3 mA). Charge time is 2 days at room temperature. Charging current is reduced at low temperatures.
Physical Size	5" wide by 7" high by 3" deep
Temperature Range	–40 to 65 degrees C (not including nickel-cadmium battery and LCD display - see Low Temperature option).
Humidity Range	0 to 95% RH, non-condensing.
Low Temperature Option	Heaters supplied for the nickel-cadmium battery and the LCD display allows operation down to –40 degrees C.

TM-STAFF 8/1/96

I. Review current priorities

II. Review process -

III Lead time -

IV. Agenda/time

V. Screens displayed - Item/Date -

VI. Skeleton wire/review - CHUCK
SUPV PLT MAINT

VII.

TRI-STAR INC.

P. O. Box 255, Middletown, Pennsylvania 17057 (717) 944-1234

July 15, 1996

Jonas P. Donmoyer Inc.
Box 74
Ono, Pa. 17077

ATTN: Mr. David B. Wallace

SUBJ: Bulk Inventory Monitoring
Our Quote No. W690WM-96 Dated July 3, 1996

Dear Mr. Wallace,

We are responding to your questions relating to the subject matter during our meeting on July 11, 1996, as follows:

1. Tri-Star Inc. will sign a non-disclosure agreement concerning the program developed for your company.

2. We offer our program development service to you at a rate of $41.00 per hour. This rate is extended for a period of 18 months subsequent to time of start-up of the initial system. At the end of the 18 month period, we reserve the right to review this rate and make adjustments if deemed necessary.

3. Our quotation offered the Lookout Limited 200 I/O Runtime software: We can offer alternate software with less I/O capabilities as follows:
   A. Lookout Runtime 100 I/O - deduct $610.00 from the price of our quotation.
   B. Lookout Runtime 50 I/O - deduct $1,250.00 from the price of our quotation.

Please let us know if you need additional information or have any further questions.

Very Truly Yours,

Walter J. Maidl

cc: TSI Quote File

Jonas P. **DONMOYER** INC.

Common Carrier

FAX 944-5401

FAX TRANSMISSION S

TRI-STAR INC.

WALTER J. MAIDL
VICE PRESIDENT, SALES

300 VINE STREET (P.O. BOX 255)
MIDDLETOWN, PENNSYLVANIA 17057
PHONE: 717-944-1234

Date: AUGUST 5, 1996

Faxed To: WALT MAIDL (Name) TRI-STAR (Firm)

From: DAVID WALLACE (Name) SALES MANAGER (Department)

Message:

PLEASE ACCEPT OUR P.O.# 95663 AS ACCEPTANCE OF YOUR QUOTE #WL90WM-96. PURCHASE ORDER TO INCLUDE "LOOKOUT RUNTIME" 100 I/O - PRICING SOFTWARE @ 6,868.00 EQUIPMENT REMOTE SITE @ 2431.00 — TOTAL 9,939.00 - PLEASE CONFIRM RECEIPT FOR OUR FILES - THANK YOU -

Our Fax Number is: 717-865-7291

Total Number of pages faxed including this cover sheet: 1

TRI-STAR INC.
P. O. Box 255, Middletown, Pennsylvania 17057 (717) 944-1234

OIPE
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

August 6, 1996

Jonas P. Donmoyer Inc.
Box 74
Ono, Pa. 17077

RECEIVED
MAR 2 0 2001
Technology Center 2100

ATTN: Mr. David Wallace, Sales Manager

SUBJ: Bulk Inventory Monitoring
Our Quote No. Q690WM-96 Dated July 3, 1996
Your P.O. 95663 Dated August 5, 1996

Dear Mr. Wallace,

Thank you for your valued purchase order in the amount of $9,939.00. We will immediately order the remote terminal equipment and begin programming to provide you with a system that functions per our quotation and the subsequent discussions held during our meetings.

Allen Baumbach II is the assigned project engineer. He will be in contact with you regarding any details which may need to be resolved.

Very Truly Yours,

Walter J. Maidl
Vice President Sales

cc: TSI Job File
AJB II

EXHIBIT H

OIPE
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David B. Wallace

Serial No: 09/167,379 Examiner: Hartman Jr., R.

Filed: 10/06/1998 Group Art Unit: 2786

For: BULK INVENTORY NETWORK SYSTEM (BINS)

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

AFFIDAVIT OF ROBERT SIDDALL

RECEIVED
MAR 2 0 2001
Technology Center 21(

I, ROBERT SIDDALL, state as follows:

1. All of the events outlined below occurred in the United States of America.
2. During the period between June, 1996 and November, 1998, I was Manager of Primary Operations for Pennsylvania Steel Technologies (PST), located at Steelton, Pennsylvania.
3. During the period between June, 1996 and November, 1998, Dave Wallace of the J.P. Donmoyer Company was permitted to install and perfect his system for monitoring a dry bulk material quantity at a remote site, at the PST facilities at Steelton.
4. In and around October, 1996, J. P. Donmoyer personnel, David Wallace, Frank Costanzo, and Mike Egbert, along with Anthony Mantione of Pennsylvania Lime, Inc., made a presentation to John Martz of PST, Joe Hahn of PST, and myself at our facilities at Steelton, Pennsylvania. The J.P. Donmoyer team outlined their proposal for an experimental installation of Dave Wallace's invention at the PST facilities. I agreed to such an experimental installation at the PST facilities, and assigned John

Martz of the PST maintenance staff to install the required telephone line and assist Daves team as needed.

5. To my knowledge and belief, numerous problems associated with the proper implementation of Dave's invention at PST had to be identified and overcome by Dave and his team during the two year and five month period between the inception of the experimental installation at PST, and its actual operation in November, 1998.

6. To my knowledge and belief, many of the components and devices associated with the installation of Dave's invention at the PST facility had to be replaced or reprogrammed during the two year and five month period between the inception of the experimental installation at PST, and its actual operation in November, 1998.

7. To my knowledge and belief, Dave and his team worked diligently throughout the foregoing period to perfect the implementation of his invention at the PST facilities.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issuing thereon.

Date: 3-6-01

Robert Siddall

Robert Siddall

EXHIBIT I

OIPE
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David B. Wallace

Serial No: 09/167,379 Examiner: Hartman Jr., R.

Filed: 10/06/1998 Group Art Unit: 2786

For: BULK INVENTORY NETWORK SYSTEM (BINS)

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

AFFIDAVIT OF JOHN MARTZ

I, JOHN MARTZ, state as follows:

1. All of the events outlined below occurred in the United States of America.
2. During the period between June, 1996 and November, 1998, I was an Electronic Technician for Pennsylvania Steel Technologies (PST), located at Steelton, Pennsylvania.
3. During the period between June, 1996 and November, 1998, Dave Wallace of the J.P. Donmoyer Company was permitted to install and perfect his system for monitoring a dry bulk material quantity at a remote site, at the PST facilities at Steelton.
4. In and around October, 1996, J. P. Donmoyer personnel, David Wallace, Frank Costanzo, and Mike Egbert, along with Anthony Mantione of Pennsylvania Lime, Inc., made a presentation to Robert Siddall of PST, Joe Hahn of PST, and myself at our facilities at Steelton, Pennsylvania. The J.P. Donmoyer team outlined their proposal for an experimental installation of Dave Wallace's invention at the PST facilities. I was assigned by Robert Siddall, Primary Operations Manager, to install the required signal line.

5. To my knowledge and belief, numerous problems associated with the proper implementation of Dave's invention at PST had to be identified and overcome by Dave and his team during the two year and five month period between the inception of the experimental installation at PST, and its actual operation, in November, 1998.

6. Many of the components and devices associated with the installation of Dave's invention at the PST facility had to be replaced or reprogrammed during the two year and five month period between the inception of the experimental installation at PST, and its actual operation November, 1998.

7. From time to time between June, 1996 and November, 1998, I assisted Dave and his team in their efforts to obtain a working installation of Dave's invention. My involvement was necessitated due to the intimate relationship between Dave's level detector, remote telemetry unit and PST's lime and carbon injection silo's, as well as the system's use of a PST maintained phone line.

8. To my knowledge and belief, Dave and his team worked diligently throughout the foregoing period to perfect the implementation of his invention at the PST facilities.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issuing thereon.

Date: 3/6/2001

John K. Martz

John Martz

HBG\69825.1

EXHIBIT J

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David B. Wallace

Serial No: 09/167,379. Examiner: Hartman Jr., R.

Filed: 10/06/1998 Group Art Unit: 2786

For: BULK INVENTORY NETWORK SYSTEM (BINS)

OIPE JC177 MAR 13 2001 PATENT & TRADEMARK OFFICE

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

RECEIVED MAR 20 2001 Technology Center 21

AFFIDAVIT OF ANTHONY MANTIONE

I, ANTHONY MANTIONE, state as follows:

1. All of the events outlined below occurred in the United States of America.
2. I am Vice President of Sales/Marketing for lime sales at Pennsylvania Lime Inc., of Pennsylvania.
3. Pennsylvania Lime Inc., of Pennsylvania is a supplier of dry bulk lime to Pennsylvania Steel Technologies (PST) in Steelton, Pennsylvania. Lime is a necessary ingredient for the production of steel.
4. Prior to April 22, 1996, I was approached by Dave Wallace regarding the implementation of his system for monitoring a dry bulk material quantity at a remote site that included a detector for producing a first output signal corresponding to an existing material quantity; a remote telemetry unit for receiving the first output signal from the detector and producing a second output signal corresponding to the first output signal; and a computer coupled to the remote telemetry unit for receiving the second output signal from the remote telemetry unit. The computer would include software for determining the existing material quantity and a projected usage rate for the existing material quantity based on the second output signal.
5. Prior to Dave's invention, the monitoring of lime levels at silos located at our customers, such as PST, and the selection of appropriate times and quantities for delivery to those customers was time consuming and costly.

6. In and around October, 1996, I joined J. P. Donmoyer personnel, David Wallace, Frank Costanzo, and Mike Egbert, to make a presentation to John Marx of PST, Joe Hahn of PST, and Robert Siddall at the PST facilities in Steelton, Pennsylvania. The J.P. Donmoyer team outlined their proposal for an experimental installation of Dave Wallace's invention at the PST facilities.

7. I agreed on behalf of Pennsylvania Lime Inc., to take part in the experimental installation of Dave's invention at PST, to the extent that our lime deliveries would be directed by information retrieved and analyzed by Dave's invention.

8. To my knowledge and belief, numerous problems associated with the proper implementation of Dave's invention at PST were identified and had to be overcome by Dave and his team during the two year and five month period between the inception of the experimental installation at PST, and its actual operation in November, 1998.

9. Many of the components and devices associated with the installation of Dave's invention at the PST facility had to be replaced or reprogrammed during the two year and five month period between the inception of the experimental installation at PST, and its actual operation, in and around November, 1998.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issuing thereon.

Date: March 9, 2001 Anthony Mantione

Anthony Mantione

HBG\59627.2

EXHIBIT K

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OIPE JC177 MAR 1 3 2001 PATENT & TRADEMARK OFFICE

In re Application of: David B. Wallace

Serial No: 09/167,379 Examiner: Hartman Jr., R.

Filed: 10/06/1998 Group Art Unit: 2786

For: BULK INVENTORY NETWORK SYSTEM (BINS)

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

AFFIDAVIT OF STEVEN G. LOWRY

RECEIVED MAR 2 0 2001 Technology Center 2

I, STEVEN G. LOWRY, state as follows:

1. All of the events outlined below occurred in the United States of America.

2. On or about December, 1997, I was approached by Dave Wallace regarding the implementation of his system for monitoring a dry bulk material quantity at a remote site that included a detector for producing a first output signal corresponding to an existing material quantity; a remote telemetry unit for receiving the first output signal from the detector and producing a second output signal corresponding to the first output signal; and a computer coupled to the remote telemetry unit for receiving the second output signal from the remote telemetry unit. The computer would include software for determining the existing material quantity and a projected usage rate for the existing material quantity based on the second output signal.

3. On or about January 30, 1998, I met with Dave Wallace to discuss the existing implementation of his invention at Pennsylvania Steel Technologies (the PST project) and to review with him the various problems that had been encountered during his attempt to implement a

working embodiment of the invention. I also was provided with examples of the software (Lookout) and manual for my review.

4. On or about April 13, 1998, I provided Dave Wallace with an engineering report outlining my recommendations for the correction and proper implementation of Dave's bulk inventory networking system invention at PST in Steelton, Pennsylvania, Nucor, Inc., of Darlington, South Carolina, and at New Jersey Steel.

5. Between May 1, 1998 and September, 1998, I undertook to implement my recommendations for operation of Dave Wallace's invention as outlined in my report of April 13, 1998, at the PST project, the Nucor, South Carolina location, and at New Jersey Steel.

6. For example, during the months of February and March, 1998, I reviewed the existing implementation of Dave Wallace's invention at the three sites, the hardware and software associated with those implementations, and the various problems related to both software and hardware that had occurred at the PST project during the previous twelve months.

7. During the month of May, 1998, I became more intimately involved with the three experimental installations at PST, Nucor, and New Jersey Steel. I also worked to upgrade the Lookout software, the remote telemetry units, and the interface between these devices and the detectors and central computer.

8. During the months of June and July 1998, I continued to implement the plan outlined in my April 13, 1998 report. I also worked on enhancing the Lookout programming and upgrading the remote telemetry unit for the Nucor site.

9. During the months of August and September 1998, I installed the updated version of the Lookout software and directed the installation of the redesigned remote telemetry unit at the New Jersey Steel and Nucor installations.

10. On September 19, 1998, the implementation of Dave Wallace's invention at the Nucor, South Carolina facility fully functioned according to his express expectations as conceived prior to April 22, 1996.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issuing thereon.

Date: 3/6/2001 Steven G. Lowry

Steven G. Lowry

HBG\69828.1

EXHIBIT L

JIPC
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

CONFIDENTIAL

J. P. DONMOYER, INC.
ONO, PENNSYLVANIA

BULK INVENTORY NETWORK SYSTEM

ENGINEERING REPORT

APRIL 13, 1998

STEVEN G. LOWRY & ASSOCIATES, INC.
MECHANICSBURG, PENNSYLVANIA

© JP DONMOYER, UNPUBLISHED

STEVEN G. LOWRY & ASSOCIATES, INC.
438 Sioux Drive
Mechanicsburg, PA 17055
(717) 737-2442

OIPE
MAR 1 3 2001
PATENT & TRADEMARK OFFICE
JC177

April 13, 1998

Mr. David Wallace
Director, Sales and Marketing
J. P. Donmoyer, Inc.
P.O. Box 74
Ono, PA 17077

RE: Engineering Report – Instrumentation for Bulk Inventory Network System

Dear Dave:

Enclosed are three copies of the Engineering Report relating to J. P. Donmoyer's Bulk Inventory Network System. This report provides an evaluation of control concepts and alternative manufacturer equipment and instrumentation for the BINS system. The report has been finalized based on comments received during our review meeting on April 8, 1998.

If you would like to discuss the report or its findings, please contact me. I am available to meet with you at your convenience.

If you have questions, please do not hesitate to call.

Very truly yours,

STEVEN G. LOWRY & ASSOCIATES, INC.

Steven G. Lowry

Steven G. Lowry, P.E.

cc: Mr. Frank Costanzo, w/enclosures
Mr. Michael Egbert, w/enclosures

OIPE
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

J. P. DONMOYER, INC.
BULK INVENTORY NETWORK SYSTEM

ENGINEERING REPORT

TABLE OF CONTENTS

SECTION	PAGE
Introduction	1
Existing System	1
Telemetry Alternatives	2
Control Concept Alternatives	3
Manufacturer Alternatives	4
Conclusions and Recommendations	7

Figure 1 – Existing System Schematic

Appendix A – Magyar & Associates Information

Appendix B – Bristol Babcock, Inc. Information

Appendix C – Proconex Information

O · E · JC 1700
MAR 1 3 2001
PATENT & TRADEMARK OFFICE

INTRODUCTION

J. P. Donmoyer, Inc. uses a Bulk Inventory Network System (BINS) to monitor customer inventories and order delivery of materials. The BINS system depends on transmission of data from remote customer sites to a computer in the J. P. Donmoyer (JPD) office. Information, transferred by telephone communications, consists of the level or weight of material in storage at the customer's business. When a trigger level or volume is reached, dispatchers are notified that a shipment should be delivered. Customer storage records are monitored on the BINS central computer and displayed on a trend graph. The current amount and the rate of consumption of material can be observed.

The purposes of this report are to evaluate alternative telemetry methods and equipment that can be used to transmit data from the customer sites, receive it, and display it on JPD's central computer. Costs associated with each alternative are presented and recommendations are provided based on advantages, disadvantages and costs.

EXISTING SYSTEM

The existing system consists of a central computer and modem at JPD's office, and a remote telemetry unit (RTU), modem and weight or level sensor/transmitter at the customer site. This equipment was supplied by Magyar & Associates, and installed by Tri-Star, Inc. A schematic of the existing system is shown on Figure 1.

LOOKOUT software is installed and continuously running on the central computer. This Man-Machine Interface (MMI) software receives and stores data transmitted from the RTUs at each customer site. The software is programmed to display the information on a trend graph. The LOOKOUT software currently on JPD's computer is the "Run-Time" version of the program. This "Run-Time" version does not allow JPD personnel to modify or add LOOKOUT displays. Therefore, if changes or additions are desired when new customers are brought on-line, an outside firm using the "Development" version of LOOKOUT must perform the necessary programming.

The functions of the customer site equipment are to measure the level or weight of material in storage, call the central computer at JPD's office, and transfer the data into the LOOKOUT MMI software.

A Kistler-Morse ultrasonic level transmitter or strain gage is used to measure stored material. These devices typically produce a signal in the range of 4 to 20 mA proportional to material volume. The RTU receives the 4-20 mA signal and converts it into the corresponding level or weight of material. The RTU also places telephone calls, on pre-set two hour timed intervals, to JPD's computer and transfers its reading. The power supply to the RTU is 120 VAC.

The telephone connection is accomplished through modems in the RTU and JPD's central computer. If the line is in use at JPD, the RTU will redial until it establishes a connection and transmits its data. The RTU will make up to 99 repeated attempts to communicate with the central computer.

A remote telemetry unit is currently installed at the Bethlehem Steel Plant in Steelton. A second customer site is proposed for the NuCor Plant, located in Darlington, South Carolina. Additional customer sites are projected to be activated in the future.

TELEMETRY ALTERNATIVES

The general concept of a central computer at JPD's office that receives data from the customer sites and maintains material storage records is common to each telemetry alternative presented in this evaluation. The optimum system should (1) require little time and effort to install, (2) be simple to operate and allow for system programming modifications, (3) require a minimum amount of maintenance, (4) be easy to order from the manufacturer, and (5) have reasonable cost. Alternatives associated with the JPD BINS system involve communication control, the level of processing required at the central versus the remote sites, equipment manufacturer, and costs. These are grouped into the categories of control concept alternatives and manufacturer alternatives.

Control Concept Alternatives

Remote Control

A remotely controlled system involves a microprocessor based RTU, programmed to input a signal from the weight/level sensing device, place a telephone call to the central computer, and transfer data to the computer. The existing JPD BINS system monitoring the material volume at Bethlehem Steel in Steelton is remotely controlled.

The RTU controls data collection and transmission, and therefore requires relatively sophisticated programming. RTUs are usually configured using a laptop computer connected directly to a port in the RTU. Due to their complex functional capabilities, these RTUs typically are relatively expensive.

Under the remote control concept, the central computer acts primarily as a data storage and display device. The computer would be a standard personal computer. Changes to system operations, such as time intervals between data transmissions, could require a trip to the customer site to modify RTU programming.

Central Control

A centrally controlled system consists of a main computer that contacts each remote unit and retrieves data from that RTU. Customer site equipment includes a basic RTU configured to input a signal from the level/weight sensing device, and on command, transfer that data to the central computer. System configuration changes would be programmed at the central computer site and, once in operation, modifications at the RTUs should not be necessary.

System control and programming is concentrated at the central computer. However, standard control software and computer hardware capabilities are such that costs should not increase compared to a remote controlled system. The computer would be a standard personal computer. RTUs would act primarily as data collection devices and, as a result, RTU programming would be minimized.

Under a central control system, the RTUs require less processing capability. Consequently, installation, start-up and maintenance are less difficult, and costs usually are lower than for more complicated RTUs as needed in a remote controlled system. Customer site installation may involve no more than "plugging-in" the RTU to 120 VAC power and attaching the telephone line and the wire from the level/weight sensor to the RTU.

Telephone calls would be initiated by the central computer, such that the computer controls data transmission. This eliminates overlap in RTU telephone calls. However, a separate telephone line will be required for each customer site RTU. Central control of data transmission will become more important as more customers are brought on-line.

Summary

The advantage associated with a remote controlled system is the ability to use existing telephone lines, such that a separate RTU line probably will not be necessary. The advantages associated with a central controlled system include easier installation and start-up, less maintenance, central control of data transmission, central programming capability, and lower cost.

Manufacturer Alternatives

The JPD BINS telemetry application requires standard "off-the-shelf" instrumentation, and many suppliers and manufacturers provide this type of equipment. Quotes were obtained from three suppliers, as follows:

1. Magyar & Associates – Control Microsystems products
2. Bristol Babcock, Inc.
3. Proconex – Fisher-Rosemount products

The existing BINS telemetry hardware and software were supplied by Magyar & Associates. There are advantages associated with continuing to use LOOKOUT software and upgrading the BINS system, instead of replacing it. If upgraded, the data and

displays in the existing system could be transferred directly into the enhanced software, and not require translation to a new system.

The supplier quotes include all hardware and software required for the JPD BINS application, although it was assumed the existing central computer would be reused and reprogrammed, as necessary. The quotes do not include the level/weight sensing device, and do not include installation and start-up costs. Copies of the supplier and manufacturer submissions, and related product information is provided in the Appendices. A description of hardware, software and costs follows:

Magyar & Associates -- Control Microsystems

Central Control Station: Upgrade central computer software from the LOOKOUT "Run-Time" to a LOOKOUT "Development" version, configured for 100 Input/Output signals. Based on current data transmissions, this software would handle 100 customer sites.

Remote Customer Sites: Provide Control Microsystems Smartwire modules for processing communications, analog input, power supply and a modem. Up to eight analog signals (customer material volumes) can be input to each RTU. The RTU power supply would be 120 VAC. A separate telephone line would need to be connected to the modem in the RTU. The modules would be enclosed in a water tight Nema 4 cabinet.

Cost:	Hardware and Software -- Central Control Station	$ 3,100
	Hardware and Software -- Per RTU	$ 1,900

Costs represent equipment cost only, and do not include installation.

Bristol Babcock, Inc.

Central Control Station: Replace the LOOKOUT "Run-Time" software with Bristol's ZxMMI Graphics software. Bristol's system architecture also requires a separate RTU 3305 data collector module, with communication software and modem, at the central control station. The ZxMMI software will handle more than 1000 customer sites.

Remote Customer Sites: Provide Bristol Babcock's model RTU 3301 module, with power supply and modem, packaged in a Nema 4 enclosure. The model 3301 unit allows one analog input signal. The RTU power supply would be 120 VAC. A separate telephone line would need to be connected to the modem in the RTU.

Cost:	Hardware and Software – Central Control Station	$ 6,300
	Hardware and Software – Per RTU	$ 1,800

Costs represent equipment cost only, and do not include installation.

Proconex – Fisher-Rosemount

Central Control Station: Replace the LOOKOUT "Run-Time" software with Intellution FIX MMI graphics software, configured for 75 Input/Output points. Based on current data transmissions, this software would handle 75 customer sites.

Remote Customer Sites: Provide Fisher-Rosemount ROC 306 controller, with power supply, modem, and ROCPAC controller software drivers. The ROCPAC unit will handle three analog inputs, two digital inputs, and two digital outputs. The modules would be contained in a water tight Nema 4 enclosure. The RTU power supply would be 120 VAC. A separate telephone line would need to be connected to the modem.

Cost:	Hardware and Software – Central Control Station	$ 2,200
	Hardware and Software – Per RTU	$ 2,500

Costs represent equipment cost only, and do not include installation.

Summary

The advantages associated with Magyar & Associates – Control Microsystems include:

1. Lowest combined costs for the central control station and each RTU.
2. The upgraded system would be compatible with the existing BINS at Bethlehem Steel in Steelton and the proposed BINS at NuCor in South Carolina.
3. Eight analog inputs per RTU provides expansion capability at each customer site.

The advantages associated with Bristol Babcock, Inc. include:

1. Lowest costs per RTU.
2. The ZxMMI graphics software can accommodate several thousand input/output signals.

The advantages associated with Proconex – Fisher-Rosemount include:

1. Lowest cost for the central control station.
2. There is expansion capability at each customer site, including control functions, based on three analog inputs, two digital inputs and two digital outputs per RTU.

CONCLUSIONS AND RECOMMENDATIONS

1. The optimum system configuration for JPD is to concentrate command functions, programming and communication control at the central computer in JPD's office. This arrangement allows JPD staff to modify and update their system without reprogramming remotes, and should reduce overall costs. The basic RTUs utilized in a centralized system also should be easier to install and should require less maintenance than the more complex RTUs used in a remote control type system.

2. The central control concept corresponds to the optimum system configuration, and provides advantages relative to the remote control option. It is important that JPD staff have the capability to upgrade, modify and add system displays at the central control station.

3. JPD should convert their BINS application from a remote control system to a central control system.

4. JPD should proceed with the purchase of LOOKOUT "Development" software, from Magyar & Associates. This software will be used to implement the central control configuration of the system, and to prepare the displays for the NuCor

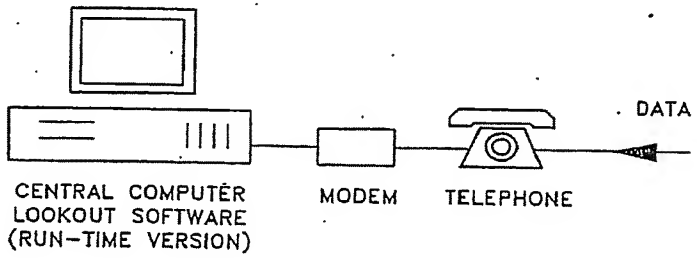
material volume. Advance planning could be made for future customer sites. The "Development" version of the software will become increasingly important as more customer sites are activated and more displays are needed.

5. Remote site equipment should be Control Microsystems products and Kistler-Morse transmitters, as supplied by Magyar & Associates. This alternative provides the lowest combined costs and has advantages associated with compatibility with the existing BINS data.

6. A complete purchase document or specifications should be prepared that defines equipment functions, delivery schedules, installation requirements, user manuals, wiring diagrams, factory testing and equipment warranties. This document would be used when purchasing customer site instrumentation.

7. Depending on site conditions, JPD should consider performing installation of customer RTUs.

DONMOYER OFFICE
CENTRAL CONTROL STATION



TYPICAL CUSTOMER SITE

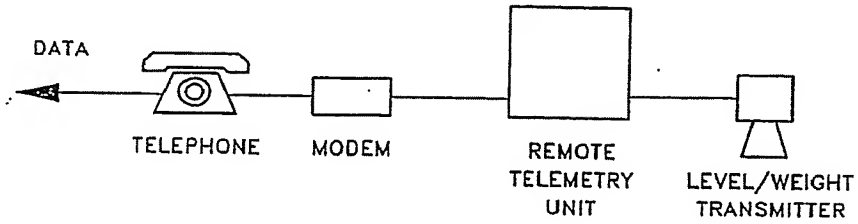


FIGURE 1

MAGYAR & ASSOCIATES, INC.

P.O.Box 5377
Bethlehem, Pa. 18015

Phone# (610)758-8595
Fax# (610)758-8596

OIPE JC177 MAR 1 3 2001 PATENT & TRADEMARK OFFICE

Thursday, March 12, 1998

Quotation# 8M032CM

To: **Steven P. Lowry & Associates**

Attn: **Steven Lowry**

From: Mike Karpa

Total # of Pages: 2

Subject: Control Microsystems SCADA System Quotation

Dear Steve,

In follow up to our conversation earlier this week, I would like to propose the following SmarWIRE SCADA package for DonMoyer's Nucor Steel application. As discussed, you will need to provide an enclosure for this system and a commercial grade modem. We distribute these products through Control Microsystems direct and would appreciate any purchase orders be addressed to Control Microsystems c/o Magyar and Associates. If you have any questions please don't hesitate to give me a call, otherwise I will plan to be in touch early next week.

Sincerely,
Mike Karpa

MAGYAR & ASSOCIATES, INC.

P.O.Box 5377
Bethlehem, Pa. 18015

Phone# (610)758-8595
Fax# (610)758-8596

Lookout 100 I/O Development System (part# 310050) License to use Lookout to develop, edit/modify, and continually monitor and control a system on one computer. Includes: Lookout License Agreement, disks, Reference Manual, Windows Draw graphics design package, all tools necessary for Lookout application development/runtime system, and all available protocol drivers.	$5,990
Model 5202 RS-232 Communication Processor (part# 297111)	$552
Model 5501-20 8-Channel Analog Input Module (part# 297113)	$558
Model 5103 Power Supply Module (part# 297102) 14-40 VDC and/or 16-24 VAC input 5V @ 1.0 ampere, 24V unreg @ 500 mA	$456
Model ACX24 Transformer (part# 294000) 120V-24V	$65
Model DIN17 Rail (part# 297128)	$16
Model SSM System Manual (part#297141)	$98

Total List Price: $7,735
Less 50% OEM Discount
Total Sale Price: $3,867.50

Quote Valid For 60 Days

SYSTEM ARCHITECTURE

Each SmartWIRE node consists of a power supply, a communication processor, an optional modem and one or more 5000 Series I/O modules. These modules are DIN-rail mounted and are interconnected by short cables which are supplied with each module.

The communication processor provides an RS-232 or RS-485 serial port which emulates the Modbus protocol. All communication with the SmartWIRE system occurs via the serial port. In addition, the communication processor provides a 100,000 baud synchronous serial port through which it accesses the 5000 Series I/O modules. Up to forty-eight 5000 Series I/O modules may be connected to this bus, providing a maximum I/O count of 64 digital inputs, 64 digital outputs, 64 analog inputs, 32 analog outputs, and 64 counter inputs (288 total I/O).

Each communication processor is assigned a unique Modbus station number using DIP switches. When a protocol master polls a specific station number, all stations receive the message but only the one to which it is addressed responds. Error detection uses CRC-16 or additive checksums in conformance with the Modbus RTU and Modbus ASCII protocols. Both versions of the Modbus protocol are emulated by the SmartWIRE.

With up to 255 SmartWIRE nodes per network, the maximum possible I/O capacity is 16320 analog inputs, 16320 digital inputs, 16320 digital outputs, 8160 analog outputs, and 16320 counter inputs.

END-TO-END TELEMETRY

In an end-to-end SmartWIRE system, two or more SmartWIREs are connected together through the communication system, which can be telephone, direct wiring or radios. Input signals from one location are reproduced as output signals at another location. This architecture is used for cable reduction and I/O signal telemetry applications. The principle characteristic of end-to-end telemetry is that no PC, PLC or DCS is needed. The SmartWIRE system operates on a stand-alone basis.

When used for end-to-end telemetry, one of the SmartWIRE communication processors is configured as the Modbus protocol master. Using Modbus, this unit polls each SmartWIRE to read the status of input signals, which are then transmitted to the outputs on a corresponding SmartWIRE. A powerful adaptive polling algorithm in the master automatically adapts to the communication system characteristics for maximum throughput.

An interesting feature of SmartWIRE is that it can also poll and write to any Modbus compatible equipment such as programmable controllers, flow computers, valve controllers, etc. Therefore, a SmartWIRE telemetry system can be used to read data directly out of a remote flow computer (for example), and reproduce the data as analog and digital outputs at another location.

REMOTE OR SLAVE I/O

When SmartWIRE is used as remote I/O or slave I/O, a personal computer, remote terminal unit (RTU), programmable controller or distributed control system acts as the Modbus protocol master. Using the Modbus ASCII or Modbus RTU communication protocols, the host can poll/write up to 255 SmartWIRE units.

Virtually all PC-based operator workstation software supports the Modbus protocol. So do many RTUs, PLCs, DCSs and man-machine interfaces (MMIs). Any device which can act as a Modbus master can interface with SmartWIRE.

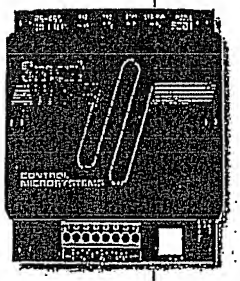
Modbus devices which can only act as slaves can often be interfaced to SmartWIRE by configuring the SmartWIRE as the master. In this case, the SmartWIRE itself will control the communication.

HOST COMMUNICATIONS

Control Microsystems products support multiple modem options, RS-232/RS-485 converters, VHF/UHF radios, and unlicensed 900 MHz radios for use with all manner of telemetry and SCADA communication systems. Please consult your local sales representative or contact Control Microsystems technical support to determine the optimum solution for your requirements.

Smart WIRE

COMMUNICATION PROCESSORS

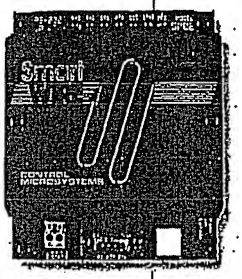


RS-485 Communication Processor

Model 5201
Part No. 297101

- **No Programming Required***
- Simple Configuration
- Industry-Standard Protocol
- Accepts 64 AI, 64 DI, 64 DO, 32 AO
- Watchdog Timer & Status Output

Up to 32 of these communication controllers can be multi-dropped on a 4000 foot long 2 or 4 wire RS-485 network. Baud rates up to 115.2 KBaud provide high throughput. Use with PCs or back-to-back for cable reduction/multiplexing.



RS-232 Communication Processor

Model 5202
Part No. 297111

- **No Programming Required***
- Simple Configuration
- Industry-Standard Protocol
- Accepts 64 AI, 64 DI, 64 DO, 32 AO
- Watchdog Timer & Status Output

Use this communication controller with modems like the Model 5902 Bell 202 modem (shown below), radio modems or spread-spectrum radios. Also suitable for direct connection to PCs or PLCs. Baud rates from 300 baud to 38.4 Kbaud.

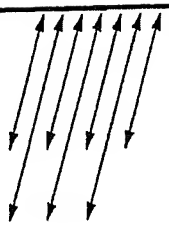
Should your project require a programmable controller, Control Microsystems can offer you the TeleSAFE Micro16. Programmable in both C and Ladder Logic, the TeleSAFE Micro16 uses the same 5000 Series I/O Modules as SmartWIRE.

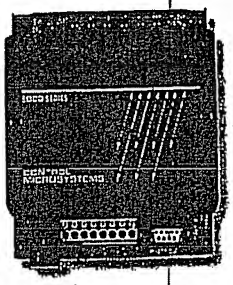
For more information, please consult the TeleSAFE Micro16 brochure, or contact your local Control Microsystems representative.

ACCESSORY MODULES

POWER SUPPLIES MODEMS

5000 SERIES



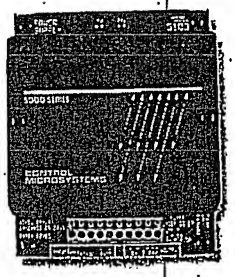


Bell 202 Telephone or Radio Modem

Model 5902
Part No. 297120

- Reliable 1200 Baud FSK
- Transformer and Optical Isolation
- Point-to-Point or Multi-Point
- Soft Carrier Turnoff
- Anti-Streaming Network Protection

Use the Model 5902 Modem for communication over telephone lines, dedicated wiring or radios. Provides outstanding performance with very low bit error rates - even on poor lines. Model 5902SA stand alone version for PCs/PLCs.



Uninterruptible Power Supply

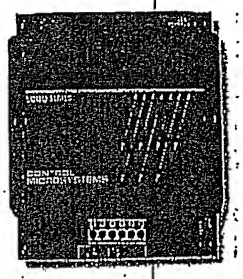
Model 5103
Part No. 297102

- Dual Outputs, 5V@ 1 A, 24V @ .5A
- Built-in Battery Charger
- Outputs Isolated From Input
- Dual AC/DC Inputs, 14-40VDC, 16-24VAC
- Cool Running DC-DC Converter

The Model 5103 provides the operating power for a SmartWIRE system. Add battery backup simply by connecting the Model 1206 Gel/Cell battery. Also makes an excellent uninterruptible power supply for general field use.

ACCESSORY MODULES

ANALOG INPUT/OUTPUT MODULES



Analog Output

Model 5301
Part No. 297112

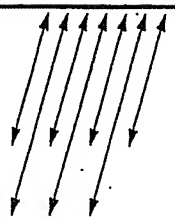
- 2 Optically Isolated Outputs
- Configurable 0 mA/4 mA Zero Scale
- Excellent Linearity
- Accepts 12V-24V Loop Power

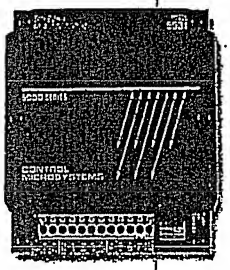
The Model 5301 Analog Output Module provides true 12 bit performance, with user configurable 0mA/4mA zero scale. Can also generate voltage outputs with use of load resistor. Suitable for solar sites with only 12V loop power.

ACCESSORY MODULES

5000 SERIES

ANALOG INPUT/OUTPUT MODULES



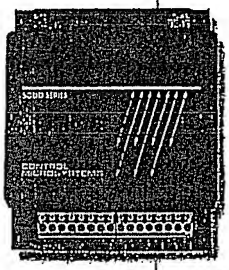


Analog Input (5 V or 20 mA)

- 8 Optically Isolated Inputs
- Configurable Zero Scale
- True 12 Bit Performance
- Transient Protected

Model 5501
Part No. (Please consult the Configuration Guide)

Available in a 5V or a 20 mA Input Range, the Model 5501 Analog Input Module features a 12 bit successive approximation A/D converter with isolation and transient suppression. The 5 V unit's Zero Scale is configurable 0V/1V, while the 20 mA unit is configurable 0mA/4mA. The 20 mA module is the same as the 5 V module, but with precision 250 ohm shunt resistors installed.

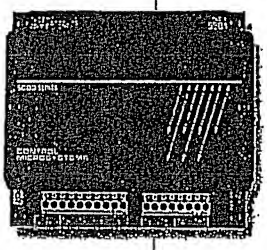


RTD Input

- 4 Optically Isolated RTD Inputs
- Minimal Self-Heating
- Configurable for 6 different Input Ranges
- Transient Protected

Model 5503
Part No. 297151

The 5503 RTD Input Module is a 4-channel, 100 ohm RTD input card for both 4-wire and 3-wire connections. The 5503 eliminates the need for additional temperature signal conditioning or transmitters required to match the industry-standard 4-20 mA inputs found on most PLCs and RTUs.

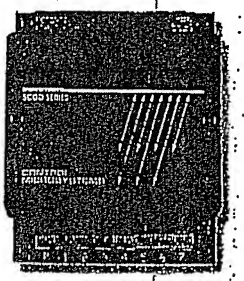


Thermocouple Input

- 8 Type J, K, T, E or ±80 mV Inputs
- Optical Isolation for high reliability
- Linearized and Cold Junction Compensated
- Transient Protected

Model 5504
Part No. 297166

The 5504 Thermocouple Input Module is an 8-channel thermocouple input card for type J, K, T, & E thermocouples. The 5504 eliminates the need for additional temperature signal conditioning or transmitters required to match the industry-standard 4-20 mA inputs found on most PLCs and RTUs.



Analog Input Simulator

- 8 Potentiometer Adjustable Inputs
- Precise, Multi-Turn Potentiometers
- 12 Bit Performance
- Perfect for Simulation or Testing
- Use for Setpoint/Alarm Level Input

Model 5521
Part No. 297119

The Model 5521 Potentiometer Analog Input Module is ideal for simulations, testing or operator input such as alarm levels. True 12 bit performance and precision potentiometers allows precise adjustment of the input value.

APPENDIX B

BRISTOL BABCOCK, INC. INFORMATION

Bristol Babcock Inc.

2035 Oak Lane
Harleysville, PA 19438
Telephone: (215) 234-0955
Fax: (215)234-0956

FAX COVER

Date: March 2, 1998

TO: Steve Lowry

FAX: 717-737-2442

Company: S. G. Lowry Associates, Inc.

FROM: L. W. Jope - Bristol Babcock, Inc.

SUBJECT: Your Trucking Company Weights Measure Application.

Total Number of Pages: One page plus cover.

Steve,

Enclosed with this cover is your quotation for the above. Items 1 and 2 go at the Data Central as well as the software, items 5, 6, 7 and 8. Items 3 and 4 go at the remote weighing location.

My quotation does not include a computer but you might be able to get away with a Keypad / Display for about $400.00 additional.

I hope this will suffice. Please call if you have questions.

Regards,

Lyn Jope

QUOTATION

Customer Name:
S. G. Lowry & Associates, Inc.
438 Sioux Drive
Mechanicsburg, Pa. 17055

Attn: Steve Lowry FAX: 717-737-2442

Bristol Babcock Inc.
2035 Oak Lane
Harleysville, Pa. 19438
PH:(215)234-0955 FAX:(215)234-0958
Quote No. LWJ030298NE-2

This quotation is being provided in regard to following Bristol Babcock equipment:

Item	Qty.	Product Code	Description	Price	U/M	Code	Extension
1	1	840	#396048-52-6, RTU 3305 for Data Central.	$1,235.00	ea	0	$ 1,235.00
2	1	840	#SAP-042-110, Nema 4 Enclosure with P. S., Dial Line Modem and Surge Protection.	$1,060.00	ea	0	$ 1,060.00
3	1	871	#3301-10A-125-1R, RTU 3301 with AI Input.	$340.00	ea	0	$ 340.00
4	1	873	Nema 4 Enclosure with P. S. and Dial Line Modem.	$1,428.00	ea	0	$ 1,428.00
5	1	898	#395241-01-4, ACCOL Software	$1,495.00	ea	0	$ 1,495.00
6	1	898	#395509-21-1, Open BSI Utilities for Windows 95 / NT	$995.00	ea	0	$ 995.00
7	1	898	#395509-24-6, Open BSI Data Collector for Windows 95 / NT	$495.00	ea	0	$ 495.00
8	1	898	#392716-01-1, ZoMMI Graphics Software	$995.00	ea	0	$ 995.00
							$ 8,044.00

Range:	Cal:	Scale:	Chart:		Drive Speed:			Mount:	Connections:
			In. Volt.	Freq.	Elect/Spri	Volts	Freq	Color	Air Elec. Elem.

SPECIAL NOTES:

F.O.B.: Watertown, Conn.
Terms: Net 30 Days
Delivery: 6 to 8 Weeks ARO

L. W. Lope
Salesperson

3/2/98
Date

Phone: 215-234-0955

This Quotation is subject to the terms and conditions, including the modifications of warranties contained therein, printed on the reverse side.

SPECIFICATION SUMMARY

D460 SS-1a

RTU 3301
REMOTE TERMINAL UNIT

The RTU 3301 family of remote terminal units provides cost-effective gathering of remote low point count I/O. The RTU 3301 communicates with other Bristol Babcock Network 3000 process controllers via RS 485, modem, and radio interfaces. It has been designed to apply to a wide range of uses:

- o Ideal for remote well monitoring applications requiring an analog and discrete input;
- o Lift station monitoring;
- o Remote pressure, temperature or flow measurement;
- o Remote contact status and control;
- o Remote set point or valve control.

Offered in a rugged field-mount housing, the complete RTU 3301 family includes models that accept input from sensors (T/C and RTD), linear and non-linear analog transmitters (current, voltage and frequency) and discrete devices (Contact Closure and logic). They convert the input to a noise-free RS 232C or RS 485 format perfect for long-distance transmission over a communication link and direct input into a DPC 3330 or DPC 3335 process controller.

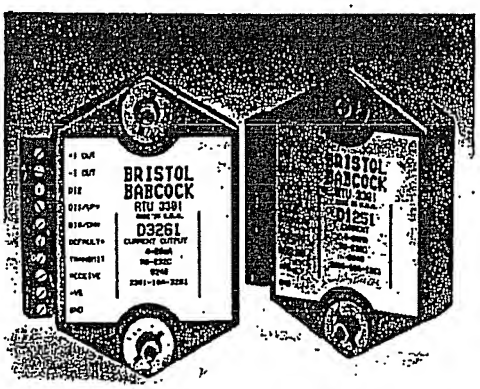
Cost-Effective Multidrop Data Acquisition

Up to 32 RTU 3301s of any type can be connected on the same communication link and input into a single DPC 3330/DPC 3335 serial port. Each module has a unique address and can be remotely accessed over the communication link to perform functions completely independent of the others.

Since only a single link is needed to collect data from up to 32 scattered field locations, the cost of running dedicated wires is eliminated.

Eight and fourteen module backplanes are available for convenient mounting of multiple RTUs in one area.

The RTU 3301 also incorporates inherent alarm and interlock capabilities which further reduce the need for additional devices.



FEATURES

- o Compact size
- o Low power consumption
- o 15 bit A/D converter; 8 conversions per second
- o -25° C to +70° C temperature range
- o RS 485 communication to 38.4 K baud
- o Serial ASCII communication with CHECKSUM
- o Compatible with DPC 3330 and DPC 3335
- o Directly compatible with Genesis operator interface through serial port

RTU 3301
REMOTE TERMINAL UNIT

SPECIFICATION SUMMARY D460 SS-1a

OPERATION OF INPUT MODULES

Each RTU 3301 module performs as a complete and self-contained single-channel interface system providing analog signal conditioning circuits optimized for a specific input type. Low level signals are amplified and then converted to digital data eight times per second by a microprocessor-controlled 15 bit integrating analog-to-digital (A/D) converter. The microprocessor continually converts any zero or span offsets, provides automatic signal filtering and converts the data to serial data for transmission to the host upon request. Each module (up to 32 per communication link) has a unique address and operates completely independent of others on the link.

Discrete Inputs/Outputs

All RTU 3301 models accept discrete inputs. Some types also provide discrete outputs (see Table 2 below). Discrete input lines accept TTL, CMOS or Contact Closure inputs. One of the discrete inputs on a module may be used as either an event counter or simply to sense switch closures or the state of remote discrete signals. Discrete outputs are open collector transistor switches that can be used to present information from or to the field or they can be activated by the internal alarms described below. The outputs are designed to activate solid state relays for alarm and other control interlock functions.

Event Counter

Each RTU 3301 contains an internal event counter, the input of which is one of the module's discrete inputs. The event counter may be used to keep a record count of any low speed event. Up to 10 million repetitions or pulses (up to 60 Hz maximum) can be stored, read and then cleared by the host DPC 3330/DPC 3335.

HI/LO Alarms

The internal alarms of the RTU consist of two alarm registers that are used to store operator-specified high and low alarm limit values. Internal alarms may be used to activate discrete outputs on the modules (current, voltage and T/C models only) to turn on alarms or to perform simple alarm/control functions.

Digital Filter

The module microprocessor automatically selects the proper filter after each A/D conversion (eight times per second). Separate time constants are configured by the user for small and large signal changes to smooth the analog data in noisy environments.

Programmable Function Option

The -PRG option may be specified for current, voltage and frequency input models to linearize any of a variety of non-linear functions including square root, nth root, nth power and high order polynomials (RTD and T/C input models automatically linearize the output without the -PRG option). A straight-line segment approximation technique is used with up to 24 segments. It also provides scaling for communication of values in engineering units. The -PRG option is also available for the analog output module to provide programmable slope rate, scaling, startup and readback values.

*Table 1a. Inputs**

Voltage	Current	Thermocouple[1]	RTD[1]	Frequency	Discrete
100 MV -100 to 100 mV 1V -1 to 1 Vdc 5V -5 to 5 Vdc 10V -10 to 10 Vdc 100V -100 to 100 Vdc	4-20 MA into 4 ohms 1 MA - 1 to 1 mA into 100 ohms 10MA -10 to 10 mA into 10 ohms 100MA - 100 to 100 mA into 1 ohm 1A -1 to 1 A into 0.1 ohm	Specify thermocouple type: J, K, T, E, R, S, B and C (spans less than 5 mV acceptable; please note accuracy specification)	PT Accepts any 2-, 3- or 4-wire 100 ohm platinum RTD; Alpha= .00385 ohm/ohm ° C (spans less than 5 ohms acceptable; note accuracy specification)	1 HZ-20 KHz Accepts frequency inputs from 1 Hz to to 20 KHz	0 Discrete inputs and outputs (15 I/O channels per unit can be configured as either inputs or outputs) or 7 discrete inputs 8 discrete outputs (Fixed)

[1] Thermocouple and RTD inputs are not available with the -PRG option.

*From listed ranges, any range, span or elevated zero may be used (i.e., 10-60 mV, 20-40 mA, 0-250 Hz, etc.).

Table 1b. Outputs

Voltage: 0-1 V
-1 to 1 Vdc
0-5 V
-5 to 5 Vdc
0-10 V
-10 to 10 Vdc
Current: 4-20 mA (adjustable to 0-20 mA)

SPECIFICATION SUMMARY

D460 SS-1a

SPECIFICATIONS

Performance

- Power: 11-30 VDC, 1.00 watt max., 1.3 watt current output
- Adjustments: Set-up information and calibration constants are entered via personal computer and are stored in non-volatile EEPROM in each module; auto zero and auto calibration eliminate the need for adjustment potentiometers
- Ambient temperature ranges:
  - Storage: -25° C to +85° C (-15° F to +185° F)
  - Operating: -25° C to +70° C (-13° F to +158° F)
- Weight: 6 oz. (170 grams)

Current/Voltage Analog Output Model

- Output resolution: 12-bit
- Accuracy: ±0.1% of full scale (all sources)
- Zero drift: +30µV/ °C, ±1 µA/ °C (17 µV/ °F, 0.11 µA/ °F)
- 1,000 conversions per second
- Current: 4-20 mA (adjustable to 0-20 mA)
- Ambient temperature effect: ±0.005% of span/ °C (±0.0014%/°F) maximum
- Output protection
  - Current: 240 V
  - Voltage: ±30 V
- Load capability
  - Current: 600 ohms
  - Voltage: 5 mA minimum, 10 mA maximum
- Setting time: 300 microseconds to ±0.1% full scale typical
- Ramp rate: Fixed at 5 seconds from 0 to full scale (auto or manual), adjustable with programmable option from .01 mA or volts per second to 10,000 mA or volts per second

Voltage/Current Inputs

- Resolution: 0.01% of F.S. scale (4 digits)
- Accuracy: ±0.02% of F.S.
- Zero drift: ±1 count maximum (auto zero)
- Ambient temperature effect
  - For voltage inputs, ±0.005% of span/ °C, maximum
  - For current inputs, ±0.008% of span/ °C, maximum
- Common mode rejection: 100 dB at 50/60 Hz
- Input protection (voltage inputs only): Up to 250 Vax
- Input impedance
  - Voltage inputs of -1 V to +1 V or smaller: 10 megohms
  - Voltage inputs -5 V to +5 V or greater: 1 megohm
- Voltage drop (current inputs only): ±0.1 V max.
- 8 conversions per second
- Isolation: Up to 500 Vrms input-to-output and input-to-power supply isolation
- Internal alarms: Open collector to 30 V; 30 mA maximum

Discrete Inputs and Outputs

- Discrete inputs: Internal pull up resistors for direct switch input on analog modules
- Voltage levels (discrete inputs): ±30 V without damage
- Switching levels (discrete inputs)
  - > High: +3.5 V minimum
  - < Low: +1.0 V maximum
- Discrete outputs: Open collector to 30 V, 30 mA maximum on analog modules; 100 mA maximum on discrete I/O modules
- Event counter: Up to 10 million positive transitions @ 60 Hz maximum, filtered for switch debounce

Thermocouple Input Models

- Resolution: ±1° C or ° F
- Overall accuracy (error from all sources): At 0°-40° C ambient, ±1.0° C maximum for T/C types J, K, T, and E; ±2.5° C maximum for T/C types R, S, B and C
- Input impedance: 100 megohms minimum
- Lead resistance effect: <20 µV per 350 ohms
- Input burnout protection: Up to 250 Vac
- Linearization: ±1° C overall accuracy (error from all sources)

RTD Input Models

- Resolution: ±0.1° C or °F
- Accuracy: ± 0.3° C
- Input connections: 2-, 3-, or 4-wires
- Excitation current: 0.25 mA
- Sensor: 100 ohm platinum
- Lead resistance effect
  - 3-wire: 2.5° C per ohm of unbalance
  - 4-wire: negligible
- Maximum lead resistance: 50 ohms
- Input protection: Up to 120 Vac
- Linearization: ±0.3° C overall accuracy (error from all sources at 25° C ambient)
- Ambient temperature effect: ±.0025%/ °C max.

Frequency Input Models

- Resolution: 0.01 Hz
- Accuracy: ±0.1% of reading, ±0.1 Hz
- Ambient temperature effect: ±0.002% of span/ °C
- Input impedance: 100 kilohms
- Switching level: Selectable OV, +2.5 V
- Hysteresis: Adjustable from ±10 mV to ±0.5 V (up to 1.0 V for units with -PRG option)
- Input protection: 250 Vac

SPECIFICATION SUMMARY

D460 SS-1a

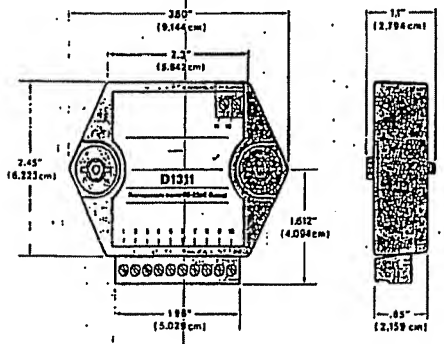
COMMUNICATION

- RS 232C or RS 485 (not user-selectable; pre-set at the factory): 2 wire
- Up to 32 multidrop nodes per host communication port (RS-485 only)
- Selectable baud rates: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400
- ASCII format command/response protocol with CHECKSUM
- Parity: odd, even or none
- All communication setups (address, baud rate, parity) stored in nonvolatile memory using EEPROM
- Communication PROM available for DPC 3330 and DPC 3335
- Communication distance: Up to 10,000 feet RS 485

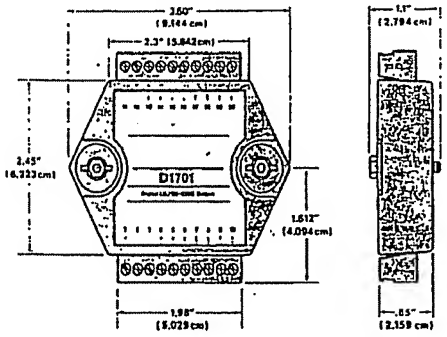
PROTOCOL

The RTU 3301 uses a serial ASCII communication protocol for interfacing to the DPC 3330/DPC 3335 / RTU 3310 process controllers. Serial ASCII, being a common and easy to implement protocol, allows the RTU 3301 to interface with many other host devices that also support ASCII. In addition, Genesis supports directly connected RTU 3301s as well as DPC 3330, RTU 3310 and DPC 3335 process controllers.

For message security, the RTU 3301 protocol employs a CHECKSUM error detection method to ensure communication reliability of both transmitted and received messages.



Analog I/O Module



Discrete I/O Module

NOTE: Spacing for mounting screws = 2.700" (6.858 cm). Screw threads are 6 x 32.

Figure 4. Mounting dimensions

Bristol Babcock

U.S.A.
Bristol Babcock Inc.
Process Control Group World Headquarters
1100 Buckingham St., Watertown, CT 06795
Telephone: (203) 575-3000
Telex: 96-2417 BRIS BAB WBY
Fax: (203) 575-3170

U.K.and European Headquarters
Bristol.Babcock Ltd.
Vale Industrial Estate
Stourport Road, Kidderminster,
Worcestershire, DY11 7QP.,England
Telephone: Kidderminster (0562) 820001
TELEX: 339586
Fax: 0562 515722

Canada
Bristol.Babcock.Canada
234 Attwell Drive
Toronto, Ontario M9W 5B3
Telephone: (416) 675-3820
Fax: (416) 674-5129

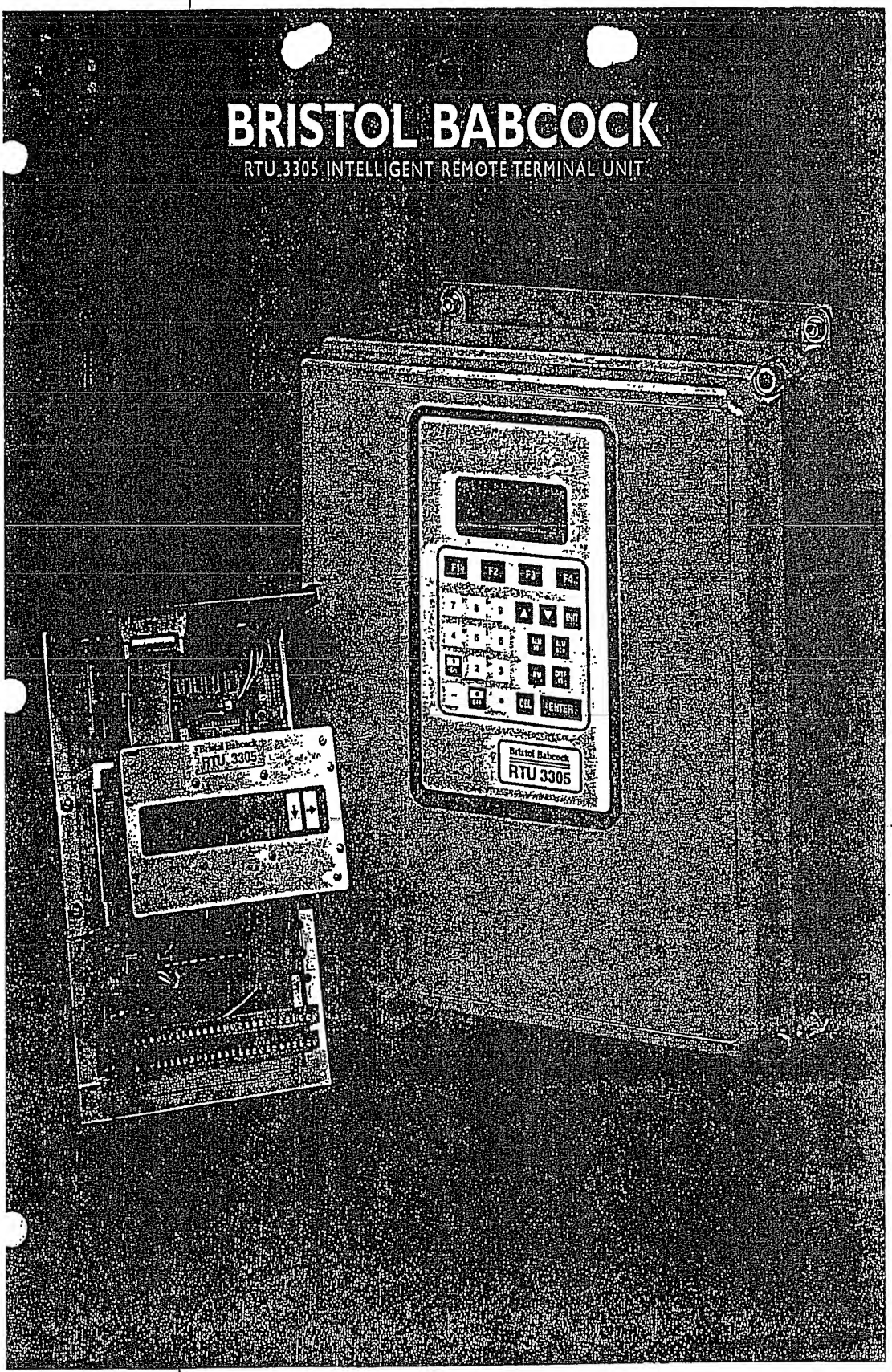
France
Bristol Babcock s.a.
31, rue du General Leclen
60250 Mouy France
Telephone: 44 56 52 06
Telex: 140397 F
Fax: 44 26 43 73

© Copyright 1991 Bristol Babcock Inc.

Printed in the U.S.

BRISTOL BABCOCK

RTU 3305 INTELLIGENT REMOTE TERMINAL UNIT



NETWORK 3000
MODEL RTU 3305 INTELLIGENT REMOTE TERMINAL UNIT

SPECIFICATION SUMMARY D465 SS-0

PROCESS I/O

- 4 Analog inputs (optional)
- 2 Analog outputs (optional)
- 8 Discrete inputs (interruptable for low speed counters)
- 2 Discrete outputs
- 6 Selectable discrete I/O
- 1 High Speed Counter Input

COMMUNICATION PORTS

The RTU 3305 includes four asynchronous serial ports:

- Local network port (RS232/RS485) - 9 pin D connector
- Local interface port (RS232) - 9 pin D connector
- Option port (RS232/optional comm card) - 9 pin D connector
- Configuration port (3 pin RS232)

OPTION PORT CAPABILITY

- RS485 Adapter
- 1200 baud private leased line modem
- 9600 baud switched network dial-line modem
- RDI (Radio Delay Interface)
- TIB (Transmitter Interface Board)
- External fiber optic modem
- Baud Rates: 300, 1200, 2400, 4800, 9600, 19200, 38400

CONFIGURATION PORT CAPABILITIES

- RS232 3 pin port
- Flashware download
- Asynchronous BSAP communication

COMMUNICATION PROTOCOLS

BSAP

- Bristol Standard Asynchronous Protocol
- ISO Standard 1745/2111/2629
- Compatible with all Bristol Network 3000 Products
- Global addressing: 1-32767 Nodes
- Hierarchy : 5 levels
- Contention Scheme: Polled

Refer to specification summary D454SS-6a

MODBUS

- Standard Modicon Modbus
- ASCII and Binary Versions
- Master or Slave configuration

ASCII

- Simple ASCII, with selectable start, stop, parity, and word format
- Used for communication with RTU 3301's and peripheral devices such as computers, printers, graphic terminals, displays, and handheld terminals
- Bidirectional communication
- Programming: Standard ACCOL Logger module uses a complete set of format commands for message configuration, handshaking, display formatting, and printed report formatting

OTHER PROTOCOLS

- Allen Bradley PLC-2, standard
- Adept protocol, optional
- Columbia Natural Gas (ANSI 3.28), optional
- El Paso Natural Gas, standard
- Teledyne-Geotech, standard
- Protocols are selectable on a per-port basis; RTU 3305 can use multiple protocols (on different ports) simultaneously
- Several others also available

ENVIRONMENTAL SUITABILITY

- Operating temperature -40 deg. C to 70 deg. C, Relative humidity: 5 to 95%, noncondensing
- RFI susceptibility: Per SAMA standard PMC 33.1-1978, using field of 10 V/Meter from 20 Mhz to 500 Mhz
- Vibration: 10-150 Hz: 1 G constant acceleration
- Instrument certification: (Pending) Class I, Division 2, Groups A, B, C, & D hazardous locations
- Power input: 12 or 24 V DC Nominal, (9 to 30.0 V DC)
- Power requirements: 3.5 watts, additional 0.5 watts for modem option
- Loop Power: 12 V/24 V
  - DI per loop .06/.12 W
  - AI per loop .56/.48 W
  - AO per loop .56/.48 W

PROCESS I/O

TERMINATIONS

- Pluggable terminations
- Screw compression terminals
- Accepts up to 12 AWG wire

ANALOG INPUTS

- 4 different inputs
- 1-5 V DC/ 4-20 ma DC, configurable

NETWORK 3000
MODEL RTU 3305
INTELLIGENT REMOTE TERMINAL UNIT

SPECIFICATION SUMMARY

D465 88-0

- Internal 24 V for 24 V version and 21 V for 12 V version source for transmitters
- 12 bit A/D
- Conversion time: 200 micro sec
- Accuracy: 4-20 ma
  0.1% at 25 deg. C
  0.2% over -20 to 70 deg. C
  0.3% over -40 to 70 deg. C
- Input filtering: single pole 50 msec time constant; 300 msec to 0.1% of input value
- Settling time: 18 micro sec to 0.01%
- Common mode protection: 180 VDC
- Surge protection: Meets C37.90-1983
- Shields may be tied to power common

ANALOG OUTPUTS (optional)

- 2 outputs
- 4-20 ma DC
- 12 bit A/D
- Accuracy:
  0.1% at 25 deg. C
  0.2% over -20 to 70 deg. C
  0.3% over -40 to 70 deg.C
- Surge protection: Meets C37.90-1983

DISCRETE INPUTS

- Internally sourced dry contacts from input power (12 V or 24 VDC)
- Current draw - 5 mA per input
- Isolation: optical isolation; 1500 V common mode isolation
- Counter inputs: interrupt-driven; maximum 300 Hz on a single input, 800 Hz total pulses on eight inputs; accumulator or frequency mode selectable in ACCOL software
- PDM input ranges:
  Bristol 5 second (1 to 4 sec);
  Bristol 15 second (3 to 12 sec);
  BIF 15 second (0 to 13.33 sec);
  BIF 60 second (0 to 53.3 sec)
- PDM input variables scaled in ACCOL software

DISCRETE OUTPUTS

- Open collector output
- 100 ma @35 V DC
- Output modes: Programmable via ACCOL
  On/off latch;
  Momentary*;
  Counter/pulse*;
  PDM;
  PDO: (Raise/lower pulse duration) with resolutions selectable: 20 ms, 50 ms, 100 ms

*durations and frequencies depend on ACCOL task interval (0.02 to 5400 sec)

HIGH SPEED COUNTER INPUT

- Internally sourced dry contacts/ open collector from input power: 5 mA current draw
- Frequency Range: 0-10 KHz
- Debounce circuitry
- Isolation: optical isolation; 1500 V common mode

ACCESSORIES

LAP TOP COMPUTER

- IBM-compatible with min. 640 K RAM
- Hard disk drive and floppy disk drive required
- MS/DOS operating system required
- RTU 3305 cable required:
  9 pin D connector cable 390486-03-5
  3 pin configuration port cable 395414-02-4

DISPLAY (optional)

Option 1:
- 2 line x 16 character alphamumeric liquid crystal display (LCD).
- Two button keypad
- Local internal mount
- Operating Range: -20 deg. C to 70 deg. C

Option 2:
- Same as option one but remote configuration for mounting on enclosure door or panel
- RS485 remote operation up to 50 feet
- Operating range: -20 deg. C to 70 deg. C

Option 3:
- Keypad/display
- 4 line x 20 character alphanumeric liquid crystal display (LCD)
- 5 x 7 dot matrix
- Membrane type with tactile feedback
- 25 keys in a 5 x 5 matrix
- 2.6 x 2.6 inch key size
- Remote configuration for mounting on enclosure door or panel
- RS485 remote operation up to 50 feet
- Operating range: -20 deg. C to 70 deg. C

Refer to specification summary D456SS-3a

POWER SUPPLIES

- Two models:
  12 VDC @ 1.8 A
  24 VDC @ 0.9 A
- Fixed IC Regulated Output
- Uninterruptable version with backup battery:
  12 volts @ 7.2 A-Hrs (8 hrs. min. backup)
  24 volts @ 7.2 A-Hrs (16 hrs. min. backup)

NETWORK 3000
MODEL RTU 3305
INTELLIGENT REMOTE TERMINAL UNIT

SPECIFICATION SUMMARY D465 SS-0

MODEMS

- Optional external or built-in modem connects to port C (option port)
- Two types of modems available:
  - 1200 baud private line modem
  - 9600 baud switched network modem for auto-dial/ auto-answer applications

TRANSMITTER INTERFACE BOARD (TIB)

- Optional, integral, plug-in board connects to port C (option port)
- Allows up to five 3508 smart transmitters to function as slaves to the RTU 3305 (24 V only)
- Communicates at 1200 baud
- Polling speed: one transmitter per second
- Provides 24 volt loop power required by 3508

Refer to specification summary D461SS-6

RADIO DELAY INTERFACE BOARD (RDI)

- Radio and satellite communication delay board
- Optional, integral, plug-in board connects to port C
- Provides RS232 interface to an external radio modem or transceiver without RTS/CTS control
- Three timing functions available:
  - Leading Edge Delay (RTS-to-CTS Delay)
  - Trailing Edge Delay
  - Carrier Time Out

Refer to specification summary D461SS-5

RS-485 Interface Board

- Optional, integral board connects to port C (option port)
- Allows local master/slave networking to other Bristol Babcock 33xx controllers, RTUs and transmitters, or devices with RS-485 capability
- Provides surge protection to the equipment from transient voltages on the communication lines
- Jumper selectable line termination and biasing for end nodes

Refer to specification summary D456 SS-2a

Minimum Requirements

- ACCOL Tools version 5.13 or later or ACCOL Workbench version 5.13 or later. ACCOL Tools requires MS Dos. ACCOL Workbench requires Windows 95 or Windows NT.
- Flash cable 395414-02-4 for port and address configuration.

Bristol Babcock

U.S.A.
Bristol Babcock Inc.
1100 Buckingham St.
Watertown, CT 06795
Telephone: (860) 945-2200
Fax: (860) 945-2213

U.K.
Bristol Babcock Ltd.
Vale Industrial Estate
Stourport Road, Kidderminster,
Worcestershire, DY11 7QP..England
Telephone: 44-562-820-001
Fax: 44-562-515-722

Canada
Bristol Babcock Canada
234 Attwell Drive
Toronto, Ontario M9W 5B3
Telephone: (416) 675-3820
Fax: (416) 674-5129

France
Bristol Mecl s.a.
Z.I. La Limoise
B.P. 70
38103 Iscoudun, France
Telephone: 33-54-21-40-74
Fax: 33-54-21-08-90

APPENDIX C

PROCONEX INFORMATION

PROCONEX™

Formerly C.B. Ives & Co.

Providing Process Control Expertise

March 6, 1998

S. G. Lowry Consulting
438 Sioux Drive
Mechanicsburg, Pa. 17055

Attn.: Steve Lowry
Phone: 410-737-2442

Ref.: Don Moyer Trucking
Quote # WD8-Y0233

Gentlemen,

We are pleased to submit the following quotation for your consideration.

Item	Qty.	Description
1	1	Fisher-Rosemount ROC 306 Remote Operations Controller with fixed number of I/O points, 3 AI, 2 DI, 2 DO. This unit is applied primarily where there is a need for remote monitoring, measurement, data archival and control functions. A local operator interface port is included along with the ROCPAC operating system firmware module Dial-up V.22bis Modem and 110VAC/24VDC power supply. **Price.....$ 1,836.00** **Delivery.....1-2 weeks ARO**
2	1	Nema 4 wall mounted enclosure (12"H x 15"W x 6"D). **Price.....$ 580.00** **Delivery.....1-2 weeks ARO**
3	1	Black Box Modem at PC Location. **Price.....$ 200.00** **Delivery.....1-2 weeks ARO**
4	1	Intellution Fix MMI Development software with license for up to 75 I/O points . **Price.....$ 1,500.00** **Delivery.....1-2 weeks ARO**

Item	Qty.	Description
5	1	Intellution Fisher-Rosemount ROC Driver to interface the PC to the Remote Operations Controler. **Price.....$ 500.00** **Delivery.....1-2 weeks ARO**
6	1	PROCONEX Systems Engineers time to program the ROC 306 and the Intellution Fix Software (8 Hours). **Price.....$ 800.00** **Delivery.....1-2 weeks ARO**
		TOTAL.....$ 5,416.00

Note: This quote assumes the following items: (1) 4-20 ma signal is available from the existing Kistler-Morse Ultrasonic Transmitter. (2) There is an existing phone line for the dial up modem at the Nucor Limestone Tank.

Prices are quoted firm for 30 days.
F.O.B. is Marshalltown Ia.
Payment Terms are Net 30, prepay and bill freight

Should this quotation become an order please address it to:

PROCONEX
3578 Concord Rd.
York, Pa. 17402

Thank you for the opportunity to quote our products on this application. Should you have any questions concerning this quotation do not hesitate to give me a call.

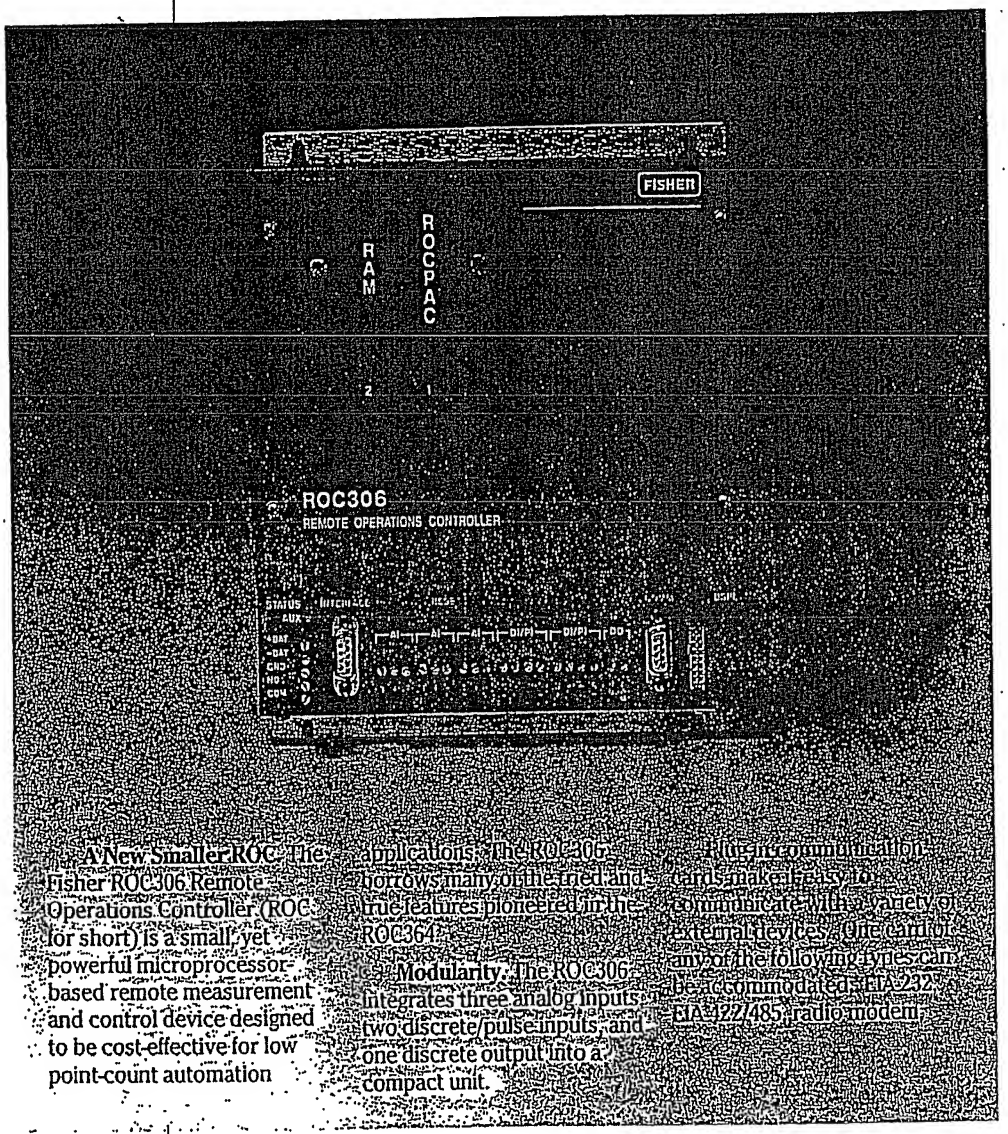
Very Truly Yours,

PROCONEX

William P. Diehl

William P. Diehl
Sales Engineer
717-751-0811

The Fisher ROC306. Small in size. Big in performance.



A New, Smaller ROC. The Fisher ROC306 Remote Operations Controller (ROC for short) is a small, yet powerful microprocessor-based remote measurement and control device designed to be cost-effective for low point-count automation applications. The ROC306 borrows many of the tried and true features pioneered in the ROC364.

Modularity. The ROC306 integrates three analog inputs, two discrete/pulse inputs, and one discrete output into a compact unit.

Plug-in communication cards make it easy to communicate with a variety of external devices. One card of any of the following types can be accommodated: EIA-232, EIA-422/485, radio modem,

FISHER

Fisher Controls

FISHER

Field Automation Systems

Type ROC306 Remote Operations Controller

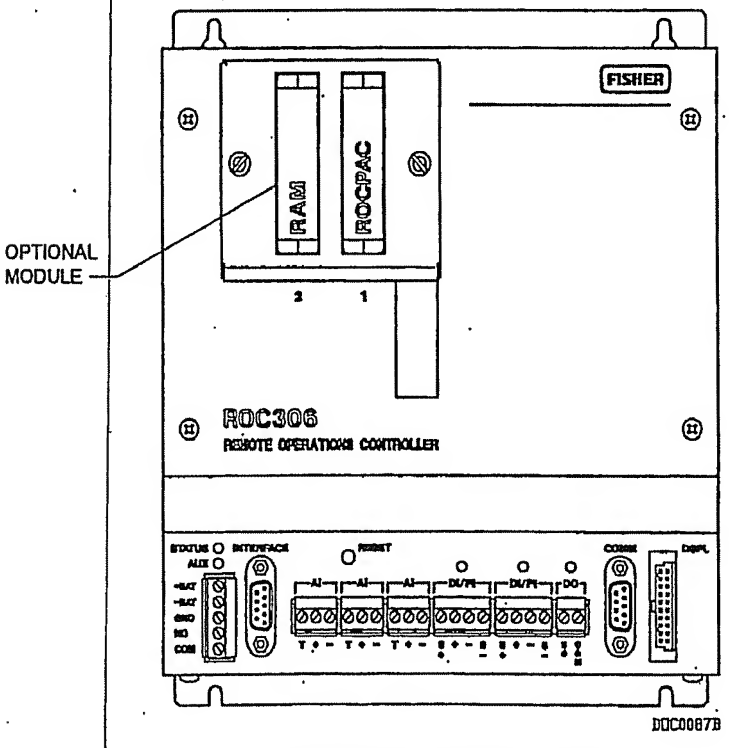
August 1994 *Specification Sheet 2:ROC306*

The Type ROC306 Remote Operations Controller (ROC) is a microprocessor-based controller that provides the functions required for a variety of field automation applications. The unit is used primarily where there is a need for remote monitoring, measurement, data archival, and control. The ROC306 is ideally suited to applications requiring flow computation, continuous and batch measurement calculations, PID control, and logic/sequencing control. It is available in two versions: one for hazardous areas, and the other for non-hazardous areas.

The ROC306 uses a single-board design that places all circuitry, including five process inputs and one process output (I/O), on a common circuit board. Both the type of I/O and the number of I/O channels is fixed.

The ROC306 consists of these components and features, which are described in the following paragraphs:

- NEC V25+ microprocessor
- on-board memory
- ROCPAC module
- slot for expansion memory
- three analog and two discrete process inputs
- one discrete process output
- operator interface port
- display port
- mounting provisions for an optional communications card and HART® Interface Card
- power fusing/terminations
- status indicators
- metal chassis and two-piece cover



ROC306 Remote Operations Controller

© Fisher Controls International, Inc., 1992-1994. All Rights Reserved.

The NEC V25+ is a 16-bit CMOS microprocessor that runs at 8 megahertz and can address up to one megabyte of memory space.

The ROC306 comes standard with 128K of on-board battery-backed random access memory (RAM) for storing data and 8K of electrically-eraseable read-only memory (EEPROM) for storing configuration parameters.

The ROCPAC module contains the operating system, applications firmware (see separate specification sheets), and communications protocol. It also provides another 128K of battery-backed RAM. RAM memory can be expanded as described under "Options."

Three analog inputs, two discrete inputs, and one discrete output are provided for interfacing to measurement and control instrumentation. The characteristics of these I/O channels are software configurable. Once configured, information is automatically passed between the ROC306 and the instrumentation.

Two additional analog inputs are dedicated to monitoring input power and circuit board temperature.

The operator interface port (INTERFACE) provides a means for direct link between the ROC306 and a personal computer. With the personal computer running the Type GV101 Configuration Software (see separate specification sheet), the user can configure the functionality of the ROC306 and monitor its operation.

The display (DSPL) port is dedicated to communications between the ROC306 and a local display panel. Through this panel, the user can access information stored in the ROC306, but cannot configure it.

The communications card expansion sockets allow a communications card and a HART card to be added to the ROC306. The communications card makes use of the COMM port for external communications and can be any of the available ROC300-series communications cards (described under "Options").

Screw terminals located on the front provide terminations for the input power (+BAT, -BAT) and auxiliary output (NO, COM). The auxiliary output consists of a set of normally-open relay contacts that are controlled by software and can be used to switch power to auxiliary devices such as a radio.

Two status indicators are provided: one for system status and one for the auxiliary output. The system status indicator, when on, indicates that operation is normal; when blinking, indicates that the ROC306 is not running; and when off, indicates the input voltage is missing or out-of-tolerance. The auxiliary output indicator, when on, shows that the auxiliary output relay is energized (closed).

The ROC306 has a metal case that helps protect the electronics from physical damage. For protection from harsh environments, the unit must be housed in an environmental enclosure (see separate specification sheets).

Options

The ROC306 supports the following options:

- Expansion RAM
- Communications Card
- HART Interface Card

Expansion RAM is available in RAM expansion modules, which are available in two sizes: 128 and 256 Kbytes. The expansion RAM needed depends primarily on the number of database points which must be archived and on the application programs to be loaded into it.

Additional information about memory modules is contained in a separate specification sheet.

The Communications Card provides an additional port for communicating to and from the ROC306. One card of the following types can be accommodated:

- EIA-232 (RS-232) for asychronous communications.
- EIA-422/EIA-485 (RS-422/RS-485) for asychronous communications.
- Radio modem for communications to a radio.
- Private line modem for communications over customer-owned lines.
- Dial-up modem for communications over a telephone network.

Additional information about the communications cards is contained in separate specification sheets.

A HART Interface Card, which requires that a communications card be present to permit its installation, is available to help provide communications with devices using the HART protocol.

Additional information about the HART card is contained in a separate specifications sheet.

Specifications

PROCESSOR	NEC V25+ running at 8 MHz.
MEMORY	**On-Board:** 128 Kbyte battery-backed SRAM for data. 8 Kbyte EEPROM for configuration. **ROCPAC:** Plug-in module with 128 Kbyte EPROM and 128 Kbyte battery-backed SRAM is standard. **RAM Expansion:** Plug-in module with 128 or 256 Kbyte battery-backed SRAM is optional. **Memory Reset:** A RESET switch enables a cold start initialization when used during power-up.
OPERATOR INTERFACE PORT	EIA-232D (RS-232D) format for use with portable operator interface. Baud is selectable from 300 to 9600 BPS. Asynchronous, 7 or 8-bit (software selectable), parity (software selectable). 9-socket D-shell connector.
TIME FUNCTIONS	**Clock Type:** 32 KHz crystal oscillator with regulated supply, battery-backed. Year/Month/Day and Hour/Minute/Second. **Clock Accuracy:** 0.01%. **Watchdog Timer:** Hardware monitor expires after 1.2 seconds and resets the processor. Processor restart is automatic.
DIAGNOSTICS	These values are monitored and alarmed: RAM validity/operation, EEPROM validity, analog input midscale voltage, DI module default status, AO module D/A voltage, DO module latch value, power input voltage, board temperature.
POWER	**Input:** 8 to 32 Vdc. 1 watt typical, excluding I/O power. **AI Loop:** 24 Vdc minimum, 4 to 20 mA is provided for transmitter loop power from an internal power converter. Power is available at the "T" terminals on the analog input connectors. **DI Source:** Input power is routed to the discrete input S+ terminal.
AUXILIARY OUTPUT	**Quantity/Type:** One dry-contact SPST relay, software switched. **Terminals:** "NO" normally-open contact, "COM" common. **Contact Rating:** 120 Vac, 5 A maximum.
ANALOG INPUTS	**Quantity/Type:** Three, single-ended voltage-sense (current loop if scaling resistor is used). **Terminals:** "T" loop power, "+" positive input, "-" negative input (common). **Voltage:** 0 to 5 Vdc, software configurable. 4 to 20 mA, with a 250 ohm resistor installed across terminals B and C. **Accuracy:** 0.3% over operating temperature range. **Impedance:** One megohm. **Filter:** Double-pole, low-pass. **Resolution:** 12 bits. **Conversion Rate:** 30 microseconds. **Sample Rate:** 50 ms maximum.
DISCRETE/ PULSE INPUTS	**Quantity/Type:** Two isolated or sourced discrete inputs. Inputs can be software-configured as two medium-speed pulse counters. **Terminals:** "S+" positive source voltage, "S-" negative source voltage, "+" positive input, "-" negative input. **Voltage:** 7 to 30 volts (ON state), 0 to 4 volts (OFF state). **Frequency:** 50 Hz maximum for discrete inputs; 1000 Hz maximum for pulse inputs. **Sample Rate:** 10 ms for discrete inputs; 50 ms for pulse inputs.
DISCRETE OUTPUTS	**Quantity/Type:** One dry-contact relay, SPST. **Terminals:** "NO" normally-open contact, "COM" common. **Contact Rating:** 125 volts DC or AC (RMS), 5 A maximum. **Isolation:** 4000 volts. **Frequency:** 10 Hz maximum. **Sample Rate:** 50 ms maximum, software selectable.

FISHER

Specifications (Cont'd)

ENVIRONMENTAL	**Operating Temperature:** -40 to 70 deg C (-40 to 158 deg F). **Storage Temperature:** -50 to 85 deg C (-58 to 185 deg F). **Operating Humidity:** 5 to 95% non-condensing. **Vibration:** Less than 0.1% effect on overall accuracy when tested to SAMA PMC 31.1, Section 5.3, Condition 3. **ESD Susceptibility:** Meets IEC 801-2, Level 3. **EMI Susceptibility:** Meets IEC 801-4, Level 4. **RFI Susceptibility:** No effect on operation of unit when tested per SAMA PMC 33.1 in field classified as 3-abc with field strength of 30 V/m, circuit board properly mounted, and cover installed.	DIMENSIONS	**Overall:** 2 in. D by 8 in. W by 8.88 in. H (51 mm by 203 mm by 225 mm). Add 1.5 in. (38 mm) to depth dimension for memory modules. **Mounting:** 6.5 in. W by 8.5 in. H (165 mm by 216 mm) between mounting holes.
		WEIGHT	3.2 lbs (1.5 kg) nominal.
		ENCLOSURE	Metal chassis and two-piece cover meet NEMA 1 rating.
		APPROVALS	**Non-hazardous area version:** approved by FM (Factory Mutual). **Hazardous area version:** Approved by FM for hazardous locations Class I, Division 2, Groups A, B, C, and D.

Accessories

A number of accessory items are available for the ROC306 that provide environmental housing, power, communications, and local monitoring. These items are described in separate specification sheets and Order Entry Document II. See your Fisher Sales Representative for more information.

Ordering Information

Ordering information is contained in Section 7 of Order Entry Document Volume II.

While this information is presented in good faith and believed to be accurate, Fisher Controls does not guarantee satisfactory results from reliance upon such information. *Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding the performance, merchantability, fitness or any other matter with respect to the products, nor as a recommendation to use any product or process in conflict with any patent. Fisher Controls reserves the right, without notice, to alter or improve the designs or specifications of the products described herein.*

FISHER **Fisher Controls**

For information, contact Fisher Controls:
Marshalltown, Iowa 50158 USA
Rochester, Kent, England ME2 2EZ
Sao Paulo 05424 Brazil
Singapore 1130

Printed in USA

FISHER

Field Automation Systems

ROC300-Series Operating System Firmware

November 1993

Specification Sheet 2.1:FW1

The ROC300-Series Operating System Firmware provides the complete operating system for a ROC300-Series Remote Operations Controller (ROC). The operating system fully supports these functions:

- o Real-Time Clock
- o System Variables
- o Input/Output Database
- o Analog Input Calibration
- o Historical Database
- o Event and Alarm Log Database
- o Communications
- o Self-Testing and Monitoring
- o Custom Displays

The firmware is written in the "C" programming language and is packaged in a ROCPAC memory module. The ROCPAC module contains both eraseable programmable read-only memory (EPROM) as well as random access memory (RAM). The ROCPAC module plugs into a socket on the Master Controller Unit (MCU).

The firmware makes use of configuration parameters which are stored by the firmware in either non-volitile (battery-backed) RAM or in electrically-eraseable programmable read-only memory (EEPROM) depending upon user requirements. Configuration is performed using Type GV101 Configuration Software running on a personal computer that plugs into the MCU.

Database values are stored in non-volitile (battery-backed) RAM. The amount of memory required depends upon database requirements.

Applications Support

The operating system firmware can support application-specific firmware packages and are supplied in the ROCPAC module. The application firmware packages, which are described in separate specification sheets, include:

- o ROC300-Series AGA Flow Firmwre
- o ROC300-Series PID Control Firmware
- o ROC300-Series Function Sequence Table Firmware
- o ROC300-Series Tank Management Firmware
- o ROC300-Series AGA Report

© Fisher Controls International, Inc., 1991, 1992, 1993. All Rights Reserved

Real-Time Clock

The real-time clock is user programmable for year, month, day, hour, minute, and second and is used to provide time and date stamping of the historical database, event log, and alarm log. The clock can also maintain the day of the week and correct for leap year.

Performance

The operating system is structured around eight tasks that are executed on a 100 millisecond cycle. The tasks are executed in a priority order with the most important tasks being performed first. The eight tasks are: I/O, system, communications, database, user, FST, PID, and AGA tasks. Each task is performed once every 100 milliseconds except for I/O and system tasks, which are performed twice every 100 milliseconds as required.

Input/Output Database

The number of input or output points supported by the operating system firmware includes the fixed I/O points in the ROC306 or ROC312 and any I/O modules plugged into a ROC312 or ROC364. The firmware automatically determines the type and location of each I/O module. Each input and output is assigned a point in the database along with its configuration parameters. The user assigns values, statuses, or identifiers to these parameters as appropriate.

During normal operation, the firmware scans each input placing values from the input into its respective database point. These values are stored in the database and can be displayed, reported, or archived.

Historical Database

The historical database provides archiving of measured and calculated variables for on-demand viewing, printing, or saving to disk. The historical database can be configured to archive the current value, average value, totalized value, or accumulated value of a point over a period of one minute, one hour, or one day. The totalized value of a point can be archived for a period of one hour or one day. Four

types of historical databases are archived: Min/Max database, minute database, periodic database, and daily database.

Event and Alarm Log Databases

The event log database records the last 240 occurences of parameter changes and power on/off cycles and the alarm log database records the last 240 occurences of alarms. The values can be viewed, printed, or saved to disk by the user.

Communications

The operating system supports both local and remote communications to devices using its own specialized communications protocol. This protocol supports serial communications directly to local devices, and radio or telephone communications to a host computer through a modem. One EIA-232 communications port is standard on all ROCs and is dedicated for use with a configuration device. Two optional communications ports are supported on the ROC364, and one optional port is supported on both the ROC306 and ROC312.

The operating system also supports standard communications protocols which allow the ROC to be integrated into systems employing non-Fisher communicating devices. These standard protocols are available as separate software modules and include:

- o Modbus ASCII protocol
- o Modbus RTU protocol
- o Hewlett-Packard HP48000 protocol

Other protocols can be supported on a customer-special basis.

Dedicated communications support is provided for the ROC300-Series Local Display Panel through the DISPLAY port located on the front of the ROC. The display panel can access the database values gathered and stored by the operating system and display them upon operator request.

Self-Testing and Monitoring

The operating system firmware supports self-testing and monitoring of the ROC300-series hardware. Items checked and verified by the firmware include:

- o RAM integrity
- o Real-time clock
- o I/O module identification
- o System voltages
- o Master Controller Unit board temperature
- o Watchdog timer
- o A/D accuracy check for analog input modules
- o D/A accuracy check for analog output modules
- o Loop check for discrete outputs

Custom Displays

The custom display capability is used to enhance operator efficiency. Displays can be created that contain only those parameters that the operator needs to, or is allowed to, change. All other information can be made inaccessible for system security.

The operating system firmware supports custom displays which are created using the Type GV101 Configuration Software. Two displays can be stored in the firmware while additional displays can be stored on the GV101 software diskette. Custom displays can contain both static and dynamic information. The static information consists of alphanumeric labels and graphical characters. The dynamic information consists of database values. By combining static and dynamic information, an exact schematic representation of the application can be created along with up-to-date values of key parameters.

FISHER

Specifications (Cont'd)			
EVENT AND ALARM LOG	**Event Log:** Records all editing operations and power-up power-down. **Alarm Log:** Records the setting and clearing of all alarms.	COMMUNI-CATIONS (CONT'D)	**Display Port:** Dedicated port for parallel communications to ROC300-Series Local Display Panel. **Protocol:** Serial ports use Fisher-developed, 8-bit binary using CRC-16 error checking. Other protocols can be supported.
COMMUNI-CATIONS	**Serial Ports:** Serial ports are supported by these configurable parameters: port tag, baud, stop bits, data bits, parity, status, mode, key-on delay, turn around delay, retry count, retry time.	CUSTOM DISPLAYS	Two user-created custom displays can be stored by the firmware. The displays can contain both static and dynamic information.

Ordering Information

Ordering information is contained in Section 7 of Order Entry Document Volume II.

While this information is presented in good faith and believed to be accurate, Fisher Controls does not guarantee satisfactory results from reliance upon such information. *Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding the performance, merchantability, fitness or any other matter with respect to the products,* nor as a recommendation to use any product or process in conflict with any patent. Fisher Controls reserves the right, without notice, to alter or improve the designs or specifications of the products described herein.